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ABSTRACT

This document represents the first phase in the development of a master plan for New Jersey Institute of Technology. It depicts the historical background and contemporary operations of the Institute and delineates planning principles and goals for the next decade. The following areas are covered: historical information about curricular and research programs; student characteristics; enrollment trends; cooperation with other institutions; special programs; scope and quality of academic programs; research and graduate programs; research program review process and financial support for research; continuing education; public service activities; faculty concerns; library, media center, and student services; Institute and public relations; facilities and resources; an the planning process of the Institute. Appendices include information on program offerings, demographic and enrollment data, faculty data, supporting services data, and a comparative survey of research expenditures. (SW)

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MASTER PLAN

PHASE I

JUNE, 1978

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INTRODUCTION

This document represents the first phase in the development of a master plan for New Jersey Institute of Technology. It depicts the historical background and contemporary operations of the Institute; and delineates planning principles to be followed and goals to be pursued in the next decade.

This effort is the Institute's first attempt at comprehensive planning in which all segments of faculty and staff were involved. It represents much more a consensus than it does the judgment of a few senior faculty and administrators. Depicted here are paths along which the Institute may develop in the changing milieu uncertainly predicted for the future; not a straitjacket within which change is difficult or impossible.

The time constraint of one academic year coupled with the initial absence of an ongoing planning process has limited this phase of planning to a selection of goals and a discussion of issues, with many questions unanswered. There is little specificity in regard to setting priorities and scheduling objectives in consonance with anticipated personnel and financial resources. Indeed, the final chapter outlines a continuing planning cycle which can be established to cope with these difficult issues. Their resolution will be presented in forthcoming phases of NJIT's master plan. The Chancellor of Higher Education has called* for two such instruments: a summary planning document in 1979 and a final plan due in April, 1980.

Many persons contributed their talents and time to the production of this plan; those formally serving on the committees are listed in the Appendix.

Charles R. Bergmann

Charles R. Bergmann
President

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*"A Draft of a Call by the Board of Higher Education for the Preparation of the 1980 New Jersey Higher Education Statewide Plan", T. Edward Hollander, April 27, 1978.

CHAPTER I MISSION AND PRIORITIES OF THE INSTITUTE

1. MISSION STATEMENT

In its educational, research, and public service activities, New Jersey Institute of Technology focuses on the technological enterprise in a complex urban society. The Institute's educational programs offer preparation for professional careers in architecture, engineering, management, the sciences, and technology. Its research efforts are applications-oriented, with a special emphasis on interactions between technology and society. Public service activities apply the Institute's special expertise to the manifold problems of America's most urbanized state.

Because the Institute seeks to serve all the citizens of New Jersey, its educational activities provide opportunities for a professional education to a broad spectrum of students. The Institute's student population ranges from the well-prepared to the educationally disadvantaged, from the high school cohort to the mature adult, from the full-time student to those requiring part-time or occasional programs. To serve this diverse population, NJIT provides educational experiences ranging from technician training to doctoral research, with a major emphasis on undergraduate professional education founded on a broad base of the sciences and humanities.

Central to the Institute's mission is the ability to meet the ever-changing technological needs of society. Founded in 1881 to provide academic background for technicians in Newark's industry, the Institute has evolved into a diversified technological university. This evolution will continue, in recognition of the dynamic nature of the Institute's response to society's needs. This response occurs within the well-established educational programs (as in the introduction of microprocessors in several curriculums), as well as within the newer programs (such as in the extension of architecture into related design and planning fields). The Institute's response to social needs is also evident in the public service activities of the faculty, which range from an involvement in setting national standards for energy conservation in buildings to service as an officer in a professional society.

In addition to generating new knowledge, the Institute's research programs support its educational and public service activities. To be fully responsive to research needs, the Institute maintains close ties with the business, industry, and government of New Jersey - and beyond. Its research may be federally funded, as in the case of its assessment of health care delivery; State funded, as in studies of the environmental impact of water resource projects; or industry funded, as with aspects of pollution control research.

As the oldest institution of higher education in Newark, the Institute interacts with the public school systems, the community colleges, and the universities in the city and in the state at large. Close relationships with high schools provide special opportunities for entry into the technical professions, as with 'School-Within-A-School,' now located in a building leased from NJIT. Effective articulation with the community colleges provides transfer opportunities in all programs. Cooperation with the universities leads to joint educational and research programs.

In striving for excellence in all its endeavors, the Institute seeks to maintain a creative and competent faculty, modern teaching and research facilities, up-to-date laboratory equipment, and a campus life attractive to the communities it serves. In this effort to excel, the Institute aggressively solicits State, federal, and private funding. As New Jersey's urban techniversity, NJIT offers a unique blend of technological education, research, and public service. In fulfilling its mission, the Institute must continue to be responsive to the needs of the State's citizens and industry, while cognizant of available resources and population trends.

2. PLANNING PRINCIPLES AND MAJOR GOALS

The mission statement suggests planning principles and fundamental precepts which the Institute will use in planning its goals for the next decade. In this section these principles and major goals will be enunciated.

Educational Directions

Located in urban Newark, NJIT is a unique technical resource for the state and city. The Institute attracts talented students, principally from low and middle income families, and offers them high quality technical programs with a broad scientific and humanistic foundation at all academic levels.

> The Institute will maintain all the essential elements for the integration of a broad professional education — the mathematical and physical sciences, social and organizational sciences, and the humanities — providing for the selection, organization and presentation of a specifically relevant curriculum.
>
> In addition to achieving a level of professional competence appropriate for entering a profession, it is expected that the NJIT graduate will have been broadly educated in many areas and will be prepared to assume high moral, ethical and aesthetic standards.
>
> To maintain high-quality academic programs and to attract excellent students and faculty, the Institute must maintain meaningful curricula from the undergraduate through the doctoral programs. In addition, relevant, stimulating research programs must exist.

Although many graduates go directly to graduate schools, NJIT has long maintained an excellent reputation for graduating practical engineers with the BS degree who are able to enter professional careers in industry. Since World War II, there has been a dramatic increase in graduate studies in Engineering and Architecture. While some contend that this will inevitably lead to the acceptance of the Master's as the first professional degree, NJIT will continue to address itself to the needs of the student seeking professional employment after he attains the Bachelor's degree. Accordingly:

> The Bachelor's will continue to be awarded as the first professional degree in all of the Institute's programs. Although the majority will find the Bachelor's degree sufficient for entry into their profession, many students, especially those interested in research and design, will continue immediately with advanced study.

The Institute has two major academic goals: to improve the quality of existing programs and to initiate new programs.

> The Institute will carry forward a major modernization program for its instructional laboratories. Innovative methods of instruction will be used, especially in upper-division design laboratories, to keep them up to date.
>
> The Institute will develop a structured approach to the integration of counseling and educational activities, particularly for first-year students. The experimental CAUSE program is one such effort. If successful, it will both improve the retention rate and program quality.
>
> The Institute will expand the practice of periodic review of its academic programs to insure the comprehensive content, quality, and economic efficiency of each.
>
> The unique cooperative study program will be consolidated and expanded, making it available to more students and more industries and governmental units.
>
> As the only publicly supported school in northern New Jersey offering BS in Engineering Technology degrees, NJIT will further develop transfer programs among engineering technology, engineering, industrial administration, and other programs, in cooperation with the community colleges.
>
> The faculty will continue to encourage the development of programs which integrate the BS and MS programs for the capable student wishing to undertake five years of full-time study.

Under the pressure of today's rapid technological and societal change, it is a certainty that new academic programs will be required within the time-span of this master plan. Moreover, some existing programs may have to be redirected or discontinued.

Student Body

NJIT (like most other technological institutions) has long educated the upwardly mobile children of blue collar and middle class families. During the past decade, however, it has assumed an important leadership role in educating those students who had been often neglected in technological schools — minority students, the disadvantaged and women.

> NJIT will maintain its leadership role in making its programs attractive to and effective for all segments of the student population requiring special supportive services, both educational and financial.
>
> Efforts to attract more black, hispanic and female students, coupled with the increasing complexities of career decisions, dictate the extension of guidance efforts to younger students in the junior high schools and to freshmen students in the junior colleges.

NJIT is the only major New Jersey institution offering practioners in the industrial community the opportunity to pursue part-time evening degree programs from the BS through the MS, to the Degree of Engineer.

> NJIT will continue to provide for the part-time and full-time post-baccalaureate student programs permitting him to sharpen his technical skills and, at the doctoral level, preparing him for a career in applied research.

An exciting area of service for NJIT, with a tremendous potential for growth, is that of continuing education. As the federal government has been shifting its funds from the space program into environmental and energy development, there has been an increased demand for professional personnel to expand their competency into new areas or to keep up-to-date in their own fields.

> The Division of Continuing Education will assume a major leadership role in continuing technical/professional education with courses ranging from state-of-the-art offerings in new fields to more formal certification programs for state or municipal licensure.

The Institute is a prime statewide resource in the areas of its various educational competencies. It is necessary, however, to provide access to the school to a greater variety of the state's population. NJIT's first dormitory, currently under construction, and its first two off-campus centers at Drew University in Madison and the Armstrong Education Center at Fort Monmouth are two attempts to provide such increased access.

> To increase students beyond commuting distance, the Institute is committed to dormitory housing on campus and to the offering of appropriate courses and programs at centers in those parts of the State where they are needed.

> Studies will be made to determine which selected portions of the Institute programs may be offered by Institute staff at off-campus locations.

Since the Institute is located near four colleges with widely divergent missions, it has a special opportunity to cooperate with its neighbors in interdisciplinary programs to address local as well as state needs. The recently approved joint doctoral program in management, involving NJIT and Rutgers, is one example of academic and administrative cooperation with our neighbors. There will be many more in the future.

> Cooperative arrangements with neighboring colleges will continue to be sought, not only for curricular programs but also in areas of instructional development and in the sharing of resources.

Research

The scope of the Institute's research activities for industry and for local and state government in recent years illustrates a potential for public service. Additionally, the research identifies NJIT as a major resource in meeting public needs which are related to the academic competencies of the Institute. A strong program in applied research involved in such areas as transportation, urban problems, health services, the environment, and energy, supports the graduate programs and makes the excellence of the Institute known.

> In the development of research programs, first considerations must be given to educational and societal needs. Program costs and benefits, student enrollment, faculty capability and interest, and relevance to department goals must also be considered.

> To expand research programs, additional sources of funding must be developed.

Public Service

NJIT's commitment to public service impinges on nearly every aspect of its programs and operations. In addition to the majority of its research programs and its pre-college guidance efforts referred to above, activities range from individual faculty and staff who serve in muncipal government to federally and foundation funded programs which use NJIT undergraduates to tutor Newark high school students. Other activities will be added in the future.

Faculty and Staff

Nothing is more important to the academic strength and development of an educational institution than a virgorous, capable and involved faculty. It is generally accepted that most American colleges and universities will maintain a relatively stable faculty with little turnover for the next decade or more. Such will probably be true of NJIT, too.

The faculty faces an unusual chanllenge in the decade ahead. With stabilizing enrollments and budgetary stringency, academic programs and laboratories must be kept up-to-date and research must open new frontiers. To meet this challenge, faculty resources must be used with greatest efficiency.

At present, the Institute system of allocating faculty lines authorized by the State provides little flexibility for departments in meeting their responsibilities in teaching, research, and public service. There is also little incentive to improve faculty productivity.

> A system of allocating faculty lines will be developed to grant a department maximum flexibility in meeting its responsibilities, while at the same time providing incentives for improving productivity.

With enrollments reaching a plateau, faculty size will stabilize, with few opportunities to add people in emerging fields. To meet the challenge of rapidly developing knowledge and teaching techniques, greater attention must be paid to faculty development.

> Each department will assess the directions of development of its discipline and will prepare a strategy for faculty development to integrate this emerging knowledge into its academic and research programs.

As funds become more difficult to obtain and the costs of higher education rise, the faculty is faced with increasing pressures to document its contributions in teaching, research, and public service. This greater accountability can be achieved only if proper incentives are available. The promotion/tenure/salary system must provide adequate incentive to the individual faculty member.

> The promotion/tenure/salary system will be studied to make certain that proper recognition is given to major contributions in teaching, research, Institute service, public service, and professional activities.

If the Institute is to be responsive to the challenges that lie ahead, a spirit of cooperative decision-making must be developed, in which the faculty works closely with the administration. Effective lines of communication must be established. The faculty must play an active role in formulating policies and procedures affecting academic and research programs and Institute and departmental operations.

> An approach to Institute department governance will be developed that involves the full faculty in setting goals, developing strategy and evaluating the success of those goals and strategies.

Supporting Services and Facilities

The Institute will continue to increase support for and expand the capabilities of its Library, Instructional Media Center, and Computer Services Division.

> The Library will offer a new computer assisted service in bibliographic searching comprising a computer terminal with a trained operator.

> Services of the Instructional Media Center will be expanded with additional personnel, space and equipment.

The Institute will install cables for television monitors interconnecting its academic buildings.

NJIT's central computer facilities will be moved to larger quarters and integrated into the New Jersey Educational Computer Network as the northern node of the statewide system.

The experimental facility for computer graphics will be expanded to comprise an Institute-wide laboratory for experimentation and instruction.

The Institute's administrative tasks will, in a step-by-step manner, be transferred to a data-base to facilitate operations and planning.

Services necessary for the well being of students must be improved and expanded.

One of the central reasons that the Institute requires a comprehensive master plan is the need to integrate its academic requirements with planning for physical facilities. A physical facilities plan will be drawn up in conjunction with academic planning so that the interaction between academic priorities and costs in relation to capital outlays and debt service can be evaluated. In this fashion the fundamental problems of resource allocation can be solved.

To meet academic and research space needs and to provide some immediate relief to parking problems, the Institute will continue to acquire land and buildings in the area contiguous to the main campus.

It is recognized that fulfillment of the Institute's mission will require funding of exceptional capital needs, and that these needs will not be satisfied, at least over the next five years, from normal Institute funding. Therefore, a comprehensive institutional advancement program shall be instituted which will create, within the private philanthropic community and certain Federal and State sectors, an understanding and acceptance of the Institute's long-range plan.

Subsequent chapters will discuss these principles and goals in greater detail.

CHAPTER II N.J.I.T. IN HISTORICAL PERSPECTIVE

Certain aspects of the historical growth of the Institute, in particular its academic and research programs, its staff and facilities, are important in establishing the background from which this master plan evolves. This chapter will survey the history in four areas of development:

Curricular and research programs
Student profile and counseling
Teaching staff
Facilities and finance

Tabular and graphical data will be given for the recent past from 1970 to now.

1. CURRICULAR AND RESEARCH PROGRAMS

THE EARLY YEARS (1885-1940)

Founded in 1881 and opening its doors to students on February 9, 1885, the Newark Technical School (NTS) was established to provide what was then advanced technical training through evening courses for the artisans and mechanics of Newark's industrial employers. In 1897 day classes were added. In 1917, prior to the beginning of an engineering school the enrollment was about 600 students, only 25 of whom were registered in the day courses.

The history of the Institute's current programs begins in 1918 when the Trustees decided to add a four-year program, and in 1919 five hundred disabled veterans of World War I enrolled in it. Curricula at that time included:

1. Four-year industrial cooperative day programs leading to BS degrees in Chemical, Electrical, and Mechanical Engineering.
2. A program consisting of two years of pre-freshman work and four years of college work in the evening, leading to the degree of Associate Engineer.
3. The previous NTS evening curriculum.
4. The post-baccalaureate professional degrees of Chemical Engineer, Electrical Engineer and Mechanical Engineer.

In 1919 the institution was called the Newark College of Technology, but beginning in 1920 the engineering BS programs were offered by the "College of Engineering of the Newark Technical School." A late afternoon bridge program, dubbed "twilight courses," soon followed, enabling NTS graduatess to enter the BS programs in engineering.*

In 1926 similar programs in Civil Engineering were initiated.

In 1937 the four engineering programs were offered in full as evening programs and the "twilight" offerings were phased out.

These were years of growth in which the Newark College of Engineering became firmly established as an undergraduate engineering school with an excellent reputation within the state of New Jersey for the education of those who intended to be practicing engineers.

Forced by the rigors of engineering education to adopt a 5-year BS degrees or to terminate cooperative work, the "co-op program" was abandoned in 1940.

THE DECADE OF WORLD WAR II (1940-1950)

The burgeoning technology of the forties resulted in pressure from industry and government for additional technology and engineering education. NTS became the Special Courses Division, and from 1940 to 1945 a large array of Engineering, Science and Management War Training courses was offered, in both the day and evening.

It was also in 1940 that the Institute began offering graduate courses in various engineering fields in conjunction with Stevens Institute of Technology. By 1946 these efforts resulted in joint graduate programs with MS degrees in Civil, Chemical, Electrical and Mechanical Engineering, and an additional MS degree for the considerable number of students taking interdisciplinary studies in engineering related fields. In the period 1949-1958 degrees of MS with a Major in CE, ChE, EE, and ME were offered to students desiring a broader background than was obtainable within a single engineering field. For a decade and a half the major emphasis in the Graduate Division was on part-time evening courses for graduate engineers employed in industry.

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*The first "twilight" evening degree was awarded in 1930.

In this decade NCE became one of the leading ten engineering schools in the country in the size of its enrollment and annual degree recipients. This growth reflected the enormous need of industry in New Jersey for graduate engineers. Postwar growth in enrollment also reflected the impact of the G.I. Bill of Rights and rising living standards, both of which permitted working class youths to pursue a college education. The War Training Program of the first half of the decade led in the late 1940's, to the replacement of the Associate Engineer programs of the Special Courses Division with evening certificate programs. An Air Force ROTC program was initiated in 1949, which leads to a commission as Second Lieutenant, USAF Reserve.

THE POST-WAR ERA (1950-1970)

For many years, the Institute had emphasized the management aspects of engineering in all undergraduate programs, and had an option in the management area under the aegis of the Mechanical Engineering department. In 1950 a MS in the Management Engineering program was initiated and in 1960 a BS in Industrial Engineering was begun.

The requirements of industry for advanced engineering education manifested itself by tuition support for its employees taking graduate work in the evening, as a result of which the Institute's MS programs grew to about one thousand students. However, the development of a strong graduate school required the presence of a full-time day complement of MS and doctoral students and the development of engineering research. It was obvious too that the undergraduate division vitally needed these components as well if it was to attract outstanding faculty and students. Thus, to fulfill its mission, the Institute initiated the Doctor of Engineering Science programs in the 1960's.

First, in 1960, the doctorate was offered in Chemical and Electrical Engineering; in 1966, in Mechanical Engineering; and in 1969 in Civil Engineering. Coincidentally, teaching fellowships and research fellowships were developed through the NCE Research Foundation (now the Foundation at NJIT), established in 1957. With the development of doctoral work in the early 1960's a slow but steady start toward the development of a full-time graduate student body began. Fellowships funded under Title IV of the National Defense Education Act provided a substantial base for this development. Over the years other financial support has developed with the growth in numbers of teaching and research assistantships and industrial fellowships. In the past few years the growth of funded research has led to a significant number of research assistants.

Considerable in-house research was conducted in the first ten-year period following the establishment of the Research Foundation (1957), and these projects increased substantially in the 1960's for several reasons: (1) Faculty positions were redefined in more academically rigorous terms. (2) The developing graduate programs demanded research and research facilities. (3) A substantial number of new faculty, holding the PhD were employed. (4) Released time, research assistants, summer support, and some funds for equipment became available.

Nevertheless, no broadly based externally funded research programs developed with the exception of the transportation program in Civil Engineering, and total external funding ran under $250,000 annually until 1967.

An increasing emphasis on the sciences was evidenced in all U.S. engineering curricula during these two decades, and culminated at the Institute with the offering of a BS degree in Engineering Science in 1968, a program that grew to an enrollment of over 200 day and 30 evening students.

At the other end of the engineering spectrum, a nationwide trend developed (to some extent as a reaction to the scientific emphasis mentioned above) to provide industry with practice-oriented technical personnel. The Degree of Engineer, which had been offered since the beginning of the engineering school in 1918 as a post-BS program requiring relevant engineering experience and a thesis, was suspended in 1960 for five years. It was resumed in 1965 as a practice-oriented post-MS terminal degree requiring course work in depth in a specific engineering area followed by a design-oriented project. The program attempts to meet the requirements of the part-time evening student who needs advanced engineering education but will not profit from the discipline of a research-oriented thesis. In neither form has this program attracted a large number of students, total enrollment hovering in the range of five to ten, but it has met the need for some students with a minimal expenditure of Institute resources.

THE ENGINEERING PROGRAMS FROM 1970 THROUGH 1976

In New Jersey, later than in many industrial states, community colleges instituted two-year associate degree programs in engineering technology to meet the industrial needs mentioned in the preceeding section. In response to the demand for four-year BS degrees for graduates of these programs, in 1971 the Institute inaugurated an upper-division evening program leading to the BS degree in Engineering Technology. This program was followed in September 1972 with the establishment of upper division programs during the day. The initial programs offered were electrical, manufacturing, and mechanical technology. The construction/contracting option started in 1973 with a full-time and part-time program, and the environmental option started in 1975 with a full-time program.

Also in 1975, a Master's program in Environmental Engineering was begun in the Department of Civil and Environmental Engineering.

Meanwhile, enrollments in the original technology certificate programs had grown steadily, reaching a peak of 1329 students in 1967 and then, with the advent of the community college programs, dropping off to approximately 625 students, at which point it has remained for several years. In 1974 academic credit was initiated for these courses, making possible, where appropriate, the granting of transfer credit toward associate technology degrees in the community college programs.

Until the present decade the Institute, as Newark College of Engineering, was almost solely an engineering school. Its engineering mission had grown from certificate programs through the doctorates in engineering science. Geographically, its constituency had extended from the city of Newark to the 6-county suburban area and beyond, and its reputation had grown from state-wide to national.

A summary of the development of engineering programs is provided in the accompanying table, which indicates a growth from the original six degree programs in 1919 to the twenty-two existing today.

TABLE 2.1

SUMMARY OF NEW ENGINEERING PROGRAMS 1919-1975

Year	New Programs	Fall 1977 Enrollments[1]	Total Engineering Programs
1919	BS in ChE, EE, ME	1564	
1919	Engineer (ChE, EE, ME)	8	6
1926	BS in CE, CE	405	8
1937	Above deg. offered evg.	465	
1946	MS in CE, ChE, EE, ME	379	12
1949	Air Force ROTC program	*	
1950	MS in Management Engrg.	159	13
1953	MS[2]	**	14
1960	BS in Industrial Engrg.	150	15
1960	Dr Eng Sci in ChE, EE	40	17
1966	Dr Eng Sci in ME	6	18
1968	BS in Eng Sci	102	19
1969	Dr Eng Sci in CE	3	20
1971	BS in Eng Technology	435	21
1975	MS in Environ. Engrg.	89	22

[1] Headcount

[2] Interdisciplinary Studies in Engineering Related Fields

* Included in BS degree programs

** Included in other MS degree programs

Sources: Registrar's and Graduate Division records

A BROADENING OF MISSION (1970 - ...)

The recent growth of NCE, a traditional engineering college, to the N.J. Institute of Technology (1975) began with a year-long study culminating in a plan presented as a case study for the Middle States Association accreditation evaluation of March 1972. This study, anticipating that NJIT would become New Jersey's urban technical university, was attended by prominent educators and representatives of the state's higher education community, many of whom took part in the meetings and panel discussions.

The first additions, in 1973, were a BS in Computer Science which evolved from the Engineering Science program, and an MS in Applied Science -- for high school science teachers who wished to bring their knowledge up to date.

In response to demand for the offering of an architectural program in a public New Jersey institution, and after an in-depth study by the N.J. Society of Architects, NCE was selected in 1973 as the institution to develop an architectural program. Thus the N.J. School of Architecture was established and a 2 + 3 year Bachelor's program was initiated for freshmen and for students transfering into the third year.

Patterned after similar programs in other technological universities, the degree Bachelor of Industrial Administration was instituted in the 1973-74 academic year, following an intensive faculty research and analysis of educational and career needs. The program was planned to correlate closely with associate degree programs in business administration offered in New Jersey County Colleges.

The degree of BS in Man and Technology was offered in 1974 for the individual seeking a modern liberal education with a strong technological component. It was designed to give the student flexibility and freedom in designing his own concentration. Some suggested possibilities are: Technology Assessment; Technical Communications; Urban Studies; Technology and Environmental Studies; Pre-Law; Energy Studies; Architecture and Social Values.

Also in the years 1973-1974, NJIT ventured upon its first off-campus graduate programs, starting in 1973 with a post-MS and doctoral program in Electrical Engineering offered at Fort Monmouth. In 1974 a graduate program in Computer Science was initiated on the Drew University campus in Madison, and in 1977 the Applied Science program was offered at Mountain High School in West Orange.

The latest new degree offering is the MS in Applied Mathematics (1976), evolving from previously available courses in the Applied Science program.

A tabular summary of the growth in non-engineering technological programs is given below, and the overall gradual growth of all the Institute's programs since 1966 is shown on the accompanying graph.

TABLE 2.2

SUMMARY OF NEW NON-ENGINEERING PROGRAMS 1973-1976

Year	New Programs	Fall 1977 Enrollments*	Total Institute Programs
1973	BS in Computer Science	212	
	MS in Applied Science	50	23
1974	BS in Architecture	386	
	BS, Man and Technology	43	
	BS in Indus. Admin.	168	26
1976	MS in Applied Math.	11	28**

* Headcount
**Includes MS in Environmental Engineering, 1975

The graphs which follow show total enrollments in the undergraduate (BS program) and graduate areas in this decade. These are followed by a tabular summary of the number of graduates in each program.

A list summarizing the current program offerings, both undergraduate and graduate, is given in Table A2.1 of the Appendix.

Figure 2.1

NUMBER OF DEGREE PROGRAMS

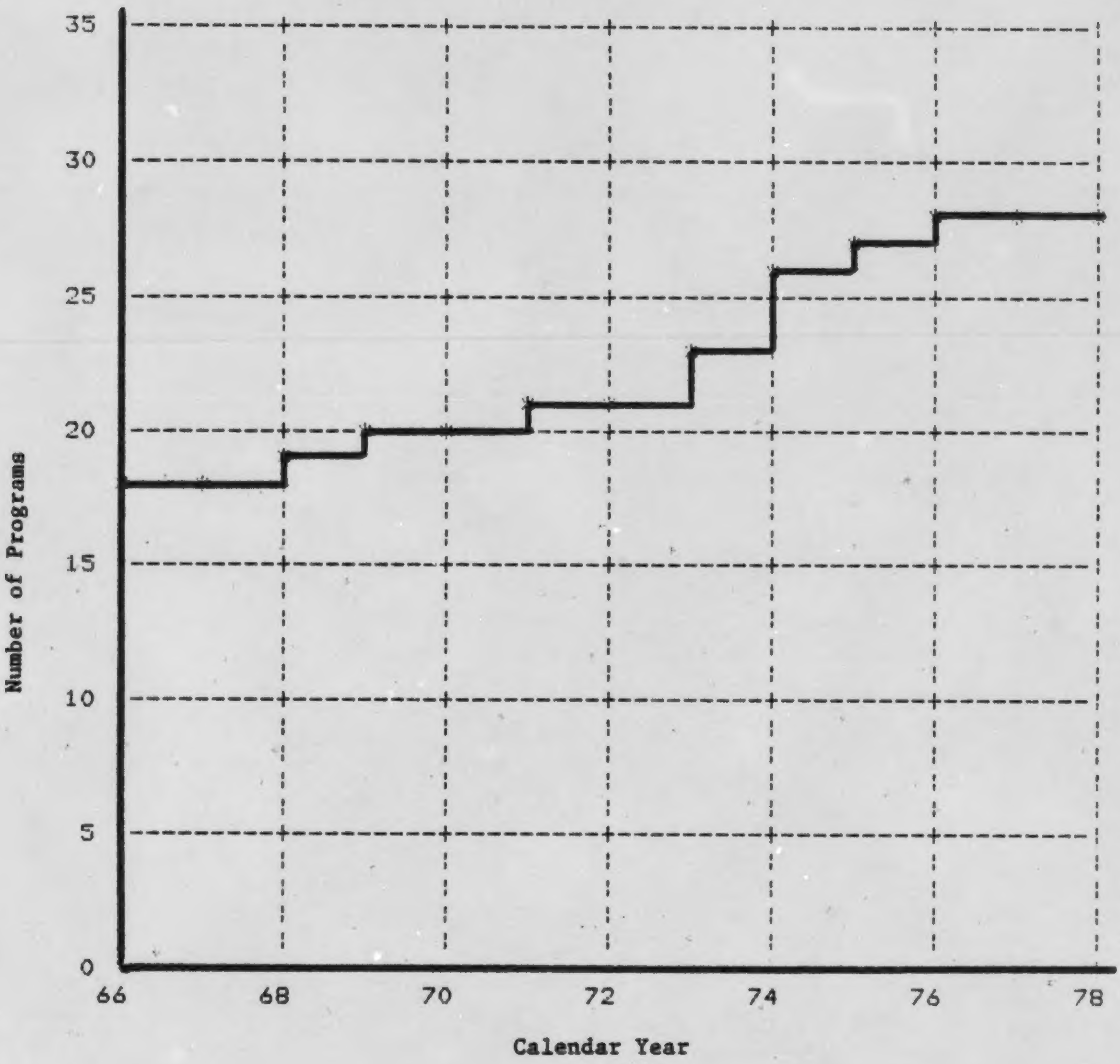

Figure 2.2

TOTAL UNDERGRADUATE ENROLLMENTS
DAY AND EVENING
(Fall Headcount)

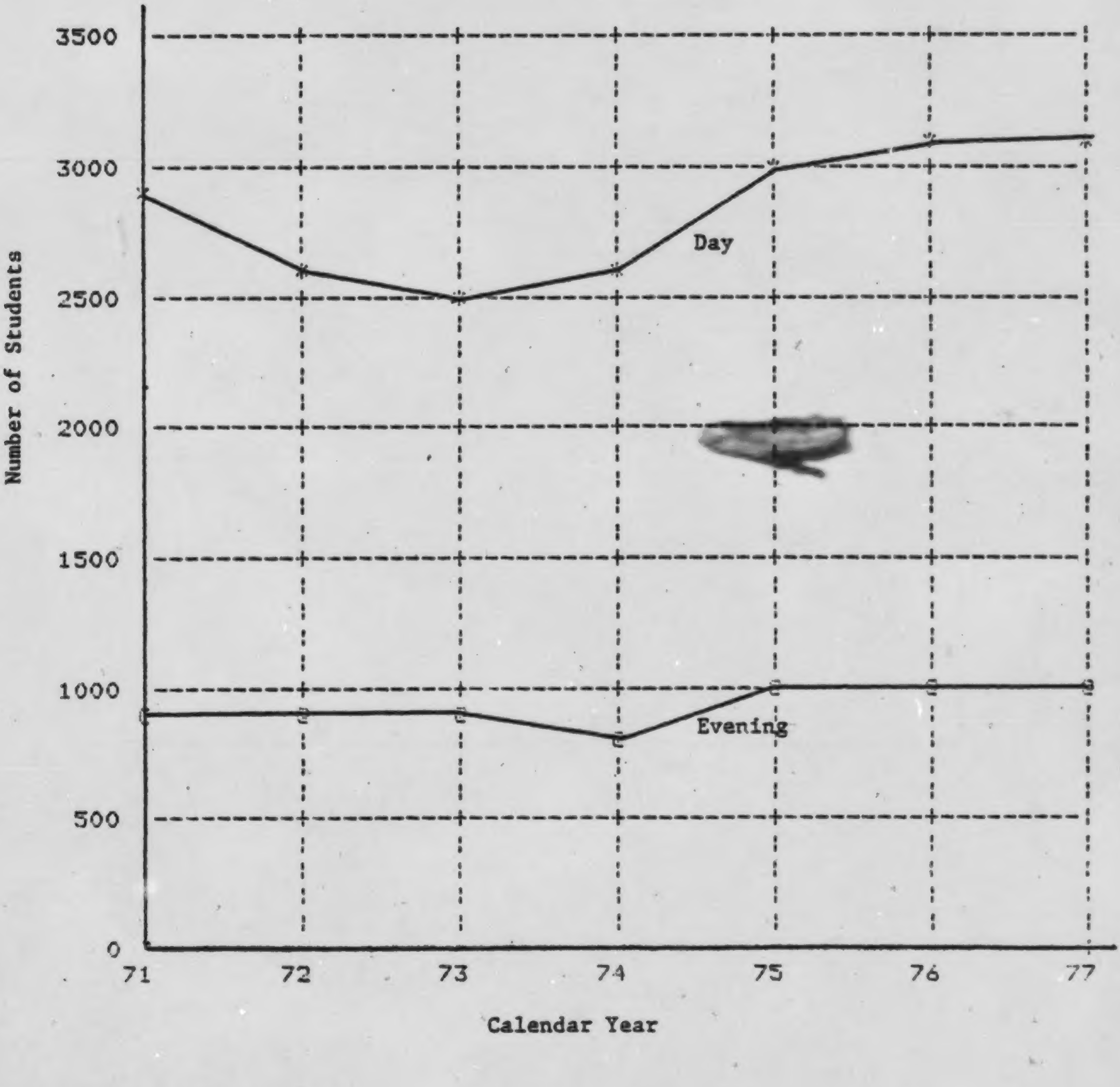

Figure 2.3

DAY UNDERGRADUATE ENROLLMENTS

(Fall Headcount)

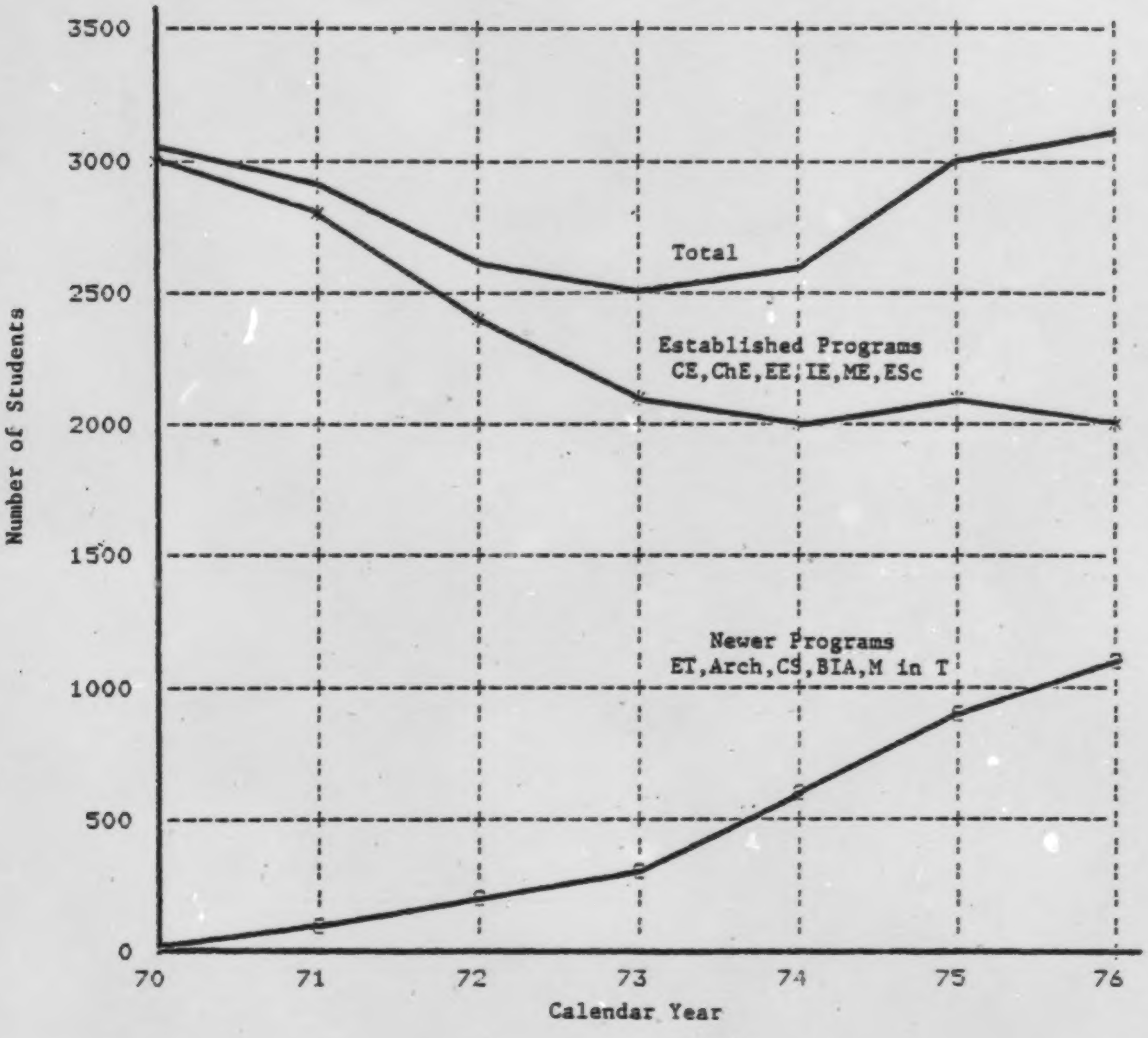

Figure 2.4

MASTER'S DEGREE ENROLLMENTS
ANNUAL NEW STUDENTS AND TOTAL ENROLLMENTS
(Fall Headcount)

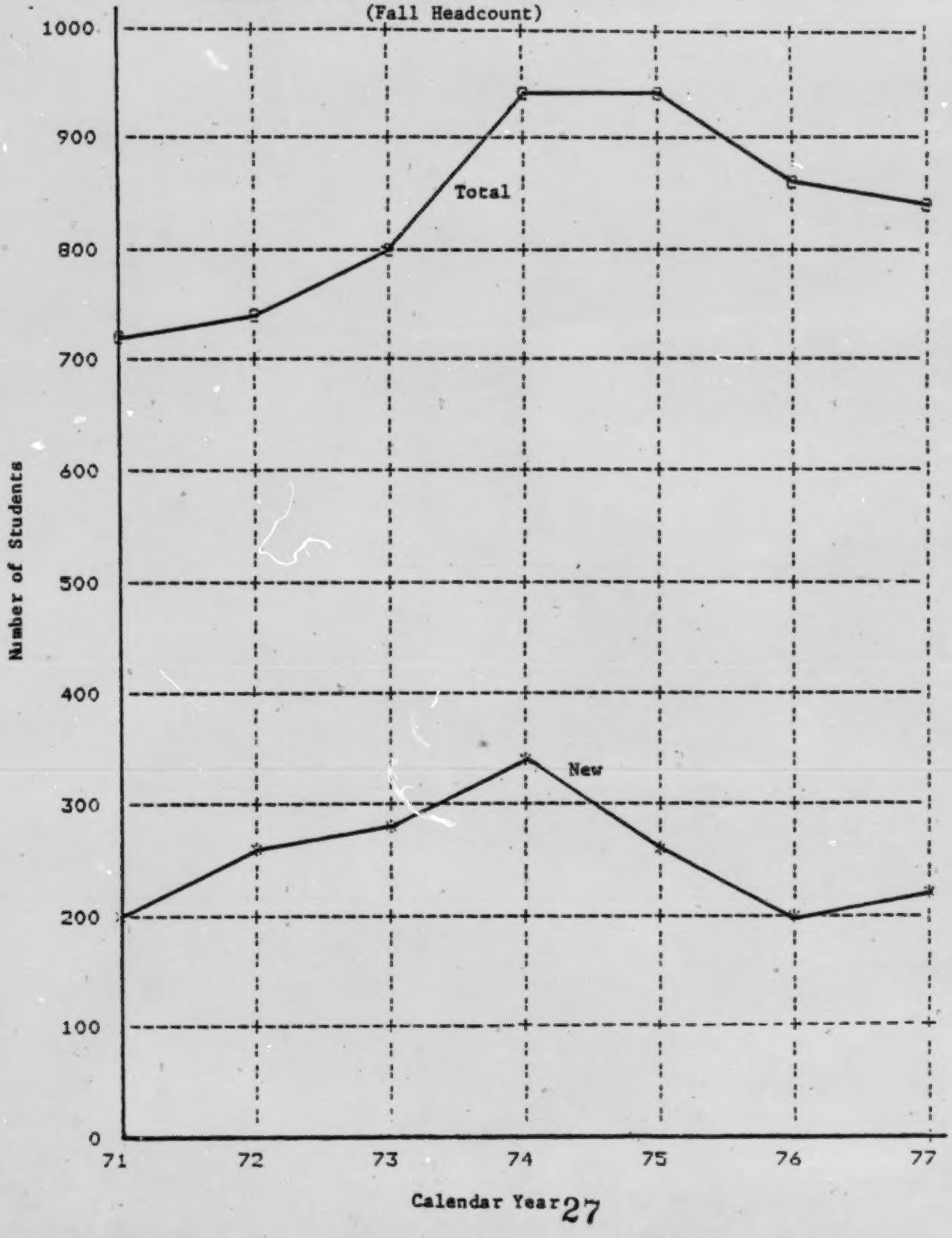

Figure 2.5

DOCTORAL AND POST-MASTER'S ENROLLMENTS, 1971-1977

(Fall Headcount)

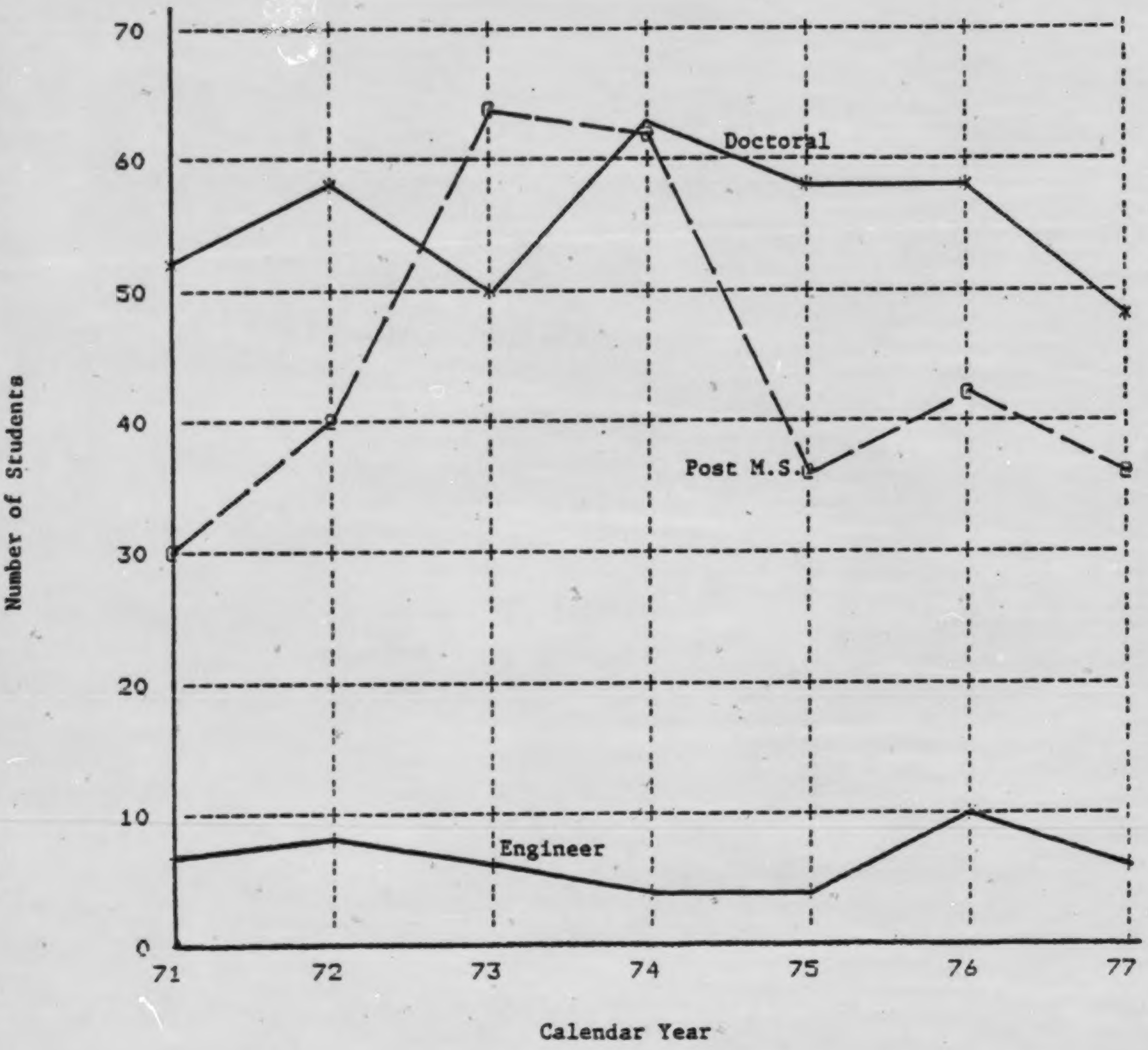

TABLE 2.3 NCE/NJIT: GRADUATES/DEGREE/MAJOR/YEAR[1]

	1970	1972	1974	1976	1977
Engineering Science Doctorate					
Chemical Engineering	4	3	-	2	1
Civil & Environmental Engrg.	-	-	-	1	1
Electrical Engineering	1	2	3	3	2
Mechanical Engineering	3	1	-	1	4
Total	8	6	3	7	8
Master of Science					
Chemical Engineering	22	13	20	12	18
Civil & Environmental Engrg.	21	32	33	38	35
Computer Science	-	-	15	17	13
Electrical Engineering	44	41	26	37	29
Engineering Science	21	26	13	6	4
Environmental Engineering	-	-	8	25	28
Industrial Engineering	44	-	-	2	4
Management Engineering	-	34	40	39	31
Mechanical Engineering	20	22	24	16	15
Applied Mathematics	-	-	-	8	3
Applied Science	-	-	-	25	16
Total	172	168	179	225	196
Bachelor of Science					
Chemical Engineering	86	65	88	69	54
Civil & Environmental Engrg.	93	122	173	131	127
Computer Science	-	-	21	16	14
Electrical Engineering	172	179	166	117	116
Industrial Administration	-	-	-	23	32
Industrial Engineering	77	93	103	50	47
Mechanical Engineering	173	174	141	90	76
Engineering Science	38	48	37	13	16
Man & Technology	-	-	-	3	2
Engineering Technology	-	-	30	83	164
Total	639	681	759	595	648
N.J. School of Architecture	-	-	-	-	17
Division of Technology (Certificates, Total)	133	77	74	80	71

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[1] Data Source: HEGIS Form 2300-2.1

Includes graduates of preceding October where applicable.

THE RESEARCH PROGRAM IN THE SEVENTIES

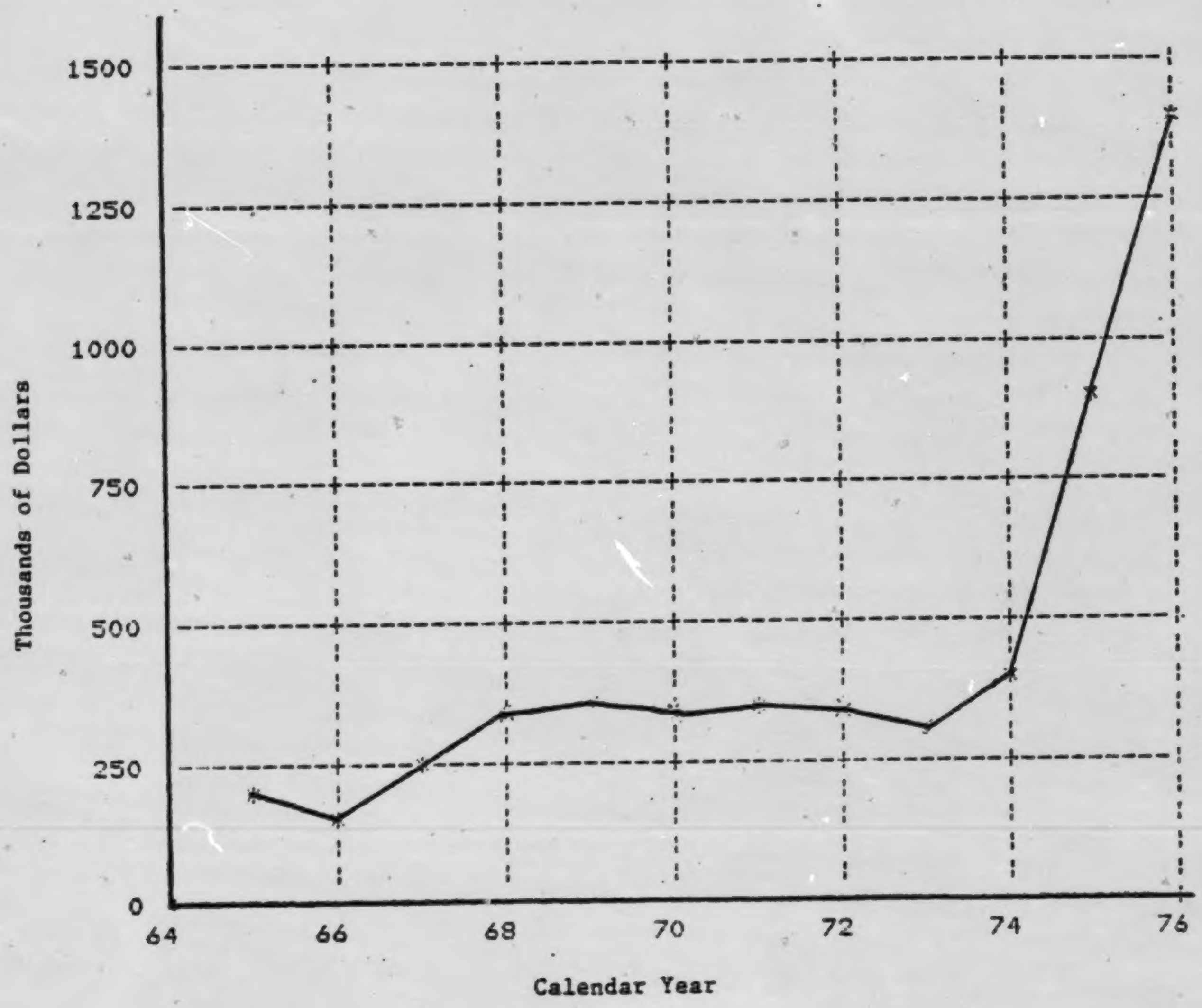
Early in the decade research support began to grow, both from state funds for research lines and from Research Foundation support.

The guidelines for in-house support were changed, and most of the Foundation's resources were spent on a limited number of promising projects. The main successes of this approach have been: (1) the development of the Center for Technology Assessment, funded to the extent of over one-half million dollars, (2) the Computer Conferencing Center project, funded to the extent of over $300,000, and (3) the Environmental Systems Laboratory, funded at approximately $100,000 per year. All of these programs have promised the potential for future growth.

Since the middle seventies 8 to 9 per cent of budgeted teaching lines have been used for research. Approximately 3% was allotted to funded projects as a cost-sharing item and the remainder allotted to research development. Earlier the Institute had managed to provide 3% to 4% of teaching lines to research. The Foundation has also spent approximately $150,000 per year, one-third to support research faculty (including summer support), one-third to support students, and one-third for laboratory equipment and supplies. A graph of annual external support for the Institute's research program shown the dramatic increase in funding over the past four years.

Figure 2.6

EXTERNAL SUPPORT OF RESEARCH
(THOUSANDS OF DOLLARS)



2. STUDENT PROFILE AND STUDENT SERVICES

FRESHMAN PROFILE

Beginning with young Newark workers in industry, the freshmen entering the institution have changed dramatically several times.

The engineering school initially was populated largely by disabled World War I veterans, under the Federal Board for Vocational Education.

During the 1930's a significant fraction of undergraduates were from families in Newark and its suburbs, middle-class families who, but for the depression, would have been able to send their children to a college away from home.

In the 1950's students came in large numbers under the G.I. Bill. They were mature, well qualified, and highly motivated. Many were married, and the majority began to commute by automobile rather than public transportation.

As a result of shifting populations and the growth of better roads, the demographic center of the Institutes' student body moved southwestward, leaving Essex County. The younger students also came by automobile and larger percentages held part-time jobs to support at least part of their expenses.

Table 2.4 gives a comparison of freshmen background in 1966 and 1973.

GRADUATE STUDENTS

Lacking dormitories, the Institute has recruited its graduate students from the same population as its undergraduates, and predictably, full-time graduate students have constituted a small minority. The majority of graduate students, working for local industry and research laboratories, have come from metropolitan-area schools; many of them have been NCE/NJIT graduates, and nearly all of the full-time graduate students are either foreign nationals or NJIT graduates, as shown by Table 2.8.

Like all engineering oriented graduate schools in the country, NJIT receives applications from many potential students from other countries. Admissions from this group (as well as from domestic applicants) has been selective. As a result foreign graduate students who are in the United States on student visas constitute less than 5% of the graduate student body. This percentage has not changed substantially over the past six years.

TABLE 2.4 FRESHMEN IN 1966 AND 1973

	PERCENTAGES OF MALE FRESHMEN			
	1966		1973	
	N.C.E.	NATIONAL	N.C.E.	NATIONAL
Father a college grad	7	17	13	18
Family income under $15,000	95	80	64	51

TABLE 2.5 SOURCES OF FRESHMEN BY TYPE OF HIGH SCHOOL

	1965	1970	1975	1977
Public High Schools	80%	72%	77%	76%
Private High Schools	20%	28%	23%	22%
Foreign	—	—	—	2%
High School Equivalency	—	—	0.2%	0.3%

TABLE 2.6 FRESHMAN HIGH SCHOOL ACHIEVEMENT

	1965	1970	1975	1977
Rank in High School Graduating Class:				
Top 20%	51.0%	37.6%	33.3%	34.6%
Top 40%	90.2%	72.8%	65.2%	66.1%
Scholastic Aptitude Test Scores:				
Mean, Verbal	515.2	490	455	450
Mean, Mathematical	620.4	603	557	568

TABLE 2.7 SOURCES OF FRESHMEN BY COUNTY

COUNTY	1965		1970		1975		1977	
	#	%	#	%	%	%	#	%
Atlantic	3	—	5	—	3	—	1	—
Bergen	106	16.3	142	17.9	131	19.6	106	18.0
Burlington	3	—	6	—	0	—	0	—
Camden	1	—	4	—	0	—	1	—
Cape May	2	—	0	—	1	—	0	—
Cumberland	1	—	3	—	0	—	1	—
Essex	150	23.0	146	18.4	128	19.2	117	20.0
Gloucester	0	—	0	—	1	—	0	—
Hudson	73	11.2	85	10.7	55	8.2	61	10.5
Hunterdon	2	—	4	—	2	—	2	—
Mercer	6	0.9	8	1.0	5	—	3	—
Middlesex	65	10.0	70	8.8	59	8.8	45	7.7
Monmouth	22	3.4	27	3.4	20	3.0	22	3.8
Morris	34	5.2	56	7.1	68	10.2	54	9.3
Ocean	5	—	5	—	6	—	5	—
Passaic	74	11.4	90	11.4	70	10.5	65	11.1
Salem	0	—	0	—	0	—	0	—
Somerset	13	2.0	18	2.3	22	3.3	13	2.2
Sussex	1	—	5	—	0	—	2	—
Union	85	13.1	103	13.0	79	11.8	73	12.5
Warren	3	—	2	—	5	—	2	—
Out-of-State	1	—	5	—			7	—
Foreign	1	—	8	—	11	—	4	—

TABLE 2.8 FOREIGN STUDENT ENROLLMENT*

	1969	1979	1971	1972	1973	1974	1975	1976
Undergrad	38	152	215	212	228	271	319	379
Graduate	133	156	201	211	204	219	206	203
Technology	19	69	78	67	67	88	78	75
TOTAL	190	377	494	490	499	578	603	657
Countries	36	49	56	54	58	61	63	67

*Includes both visa and permanent resident students.

DIVISION OF CONTINUING EDUCATION

The Division of Continuing Education has had a long history of service, not only to industry, but also to many components of the community-at-large. It provides programs to assist professionals to keep abreast of the rapidly changing technology in one of the most highly industrialized State in the nation.

Activity during the past four years is indicated in Table 2.9.

TABLE 2.9 CONTINUING EDUCATION COURSES

	1973	1974	1975	1976
Courses	25	28	35	36
Enrollment	1090	1036	1108	924

COUNSELING AND ENGINEERING OPPORTUNITY PROGRAM

The Counseling Center was established in 1945 primarily as a service to returning World War II veterans. Shortly thereafter, the counseling services were extended to NCE students. In 1948, clients from the surrounding community were first admitted on a fee basis for career counseling. More than 10,000 individuals received counseling until this program was eliminated in 1975 for budgetary reasons. For many years, the Counseling Center has had a national reputation as a source of engineering guidance materials.

Since its establishment in 1968, the Institute, through its Educational Opportunity Program has undertaken a commitment in the national effort towards increasing the number of minorities and disadvantaged students in the field of engineering.

In 1970, only 2.8 percent of the engineers in the United States were black, Chicano, Puerto Rican, or Native American. The Commission for Expanding Minority Opportunities in engineering recommended that United States schools of engineering increase the percentage of black, Chicano, Puerto Rican, and Native American students enrolled as freshmen, with the national goal of achieving population parity in the freshmen class by 1982, and in all classes by 1987 (parity is defined for the four minorities taken together as 18%, since they will make up approximately 18% of the college-age population by the 1980's).

As the Program has grown in size since it began in 1968, supportive services for program students have been expanded in scope and improved in quality. Student enrollment has increased dramatically from 20 students in 1968 to approximately 200 in 1977. Program students continue to do well academically in spite of the impoverished environment and poor academic background from which many of them have come.

The program, with its many achievements, has received national recognition resulting in the development of similarly structured programs by other engineering institutions. The report submitted by the Planning Commission for Expanding Minority Opportunites in Engineering ranks New Jersey Institute of Technology as one of the leading engineering institutions with respect to Black undergraduate engineering enrollment.

Industry continues to recruit NJIT's minority students actively and to respond positively to their demonstrated talents. Experience over the past eight years has demonstrated that minority and disadvantaged students can successfully complete a degree program in engineering or in any other technical field if they are given the opportunity and provided with intensive supportive services and adequate financial assistance. In addition, of course, NJIT has had many minority and women students entering its programs through the regular admission channels.

CAREERS OF NJIT GRADUATES

The majority of day college engineering seniors use the services of the Placement office in finding jobs at graduation. A considerable number do not need these services, and this is generally true of evening undergraduates and all advanced-degree graduates.

Comprehensive data are available only for those students who make use of the placement service and fill out the various survey questionnaires. Hence the data included here are largely for day seniors at the time of their graduation, and can be considered typical for NJIT engineering BS graduates.

As would be expected for new engineering graduates, the charts indicate that most begin their careers in design, research, and development positions or in formal industry-sponsored training programs leading to such positions.

Private industry is the largest employer. A sizable number of students go into government employment in engineering. The number going into military service reflects principally the Air Force ROTC contingent since relatively few engineering graduates were drafted upon graduation.

The fraction of NJIT graduates who enroll in full-time graduate study depends jointly on fellowship opportunities largely in science and engineering, and on the job market. The latter is a significant factor since many employers will pay for part-time graduate schooling for those who cannot locate university fellowships full-time.

Note that so far, graduates from non-engineering undergraduate programs are relatively small in number and only marginally affect the statistics given.

3. FACULTY

Newark Technical School began with part-time faculty from local industry, high schools and colleges. Full-time faculty with science and engineering degrees were recruited when the engineering college day program was formed in 1919. The full-time staff also taught in the evening division for additional remuneration.

In the 1960's, when this procedure was criticized by the accrediting agencies as inimical to the development of scholarship, consulting and research, the full-time staff's participation in the evening programs was gradually limited to one evening per week. This one evening per week can be an added assignment for "old contract" (pre-1965) staff, but must be part of the regular teaching load for "new contract" faculty members.

The result of this policy was an increase to an undersirably high percentage of adjunct teaching staff for a number of years, but as the evening undergraduate enrollment diminished in more recent years, the problem has largely been diminished for most academic departments.

The growth in teaching staff is indicated in Tables 2.10 and 2.11. In comparing figures it should be kept in mind that adjunct evening staff usually teach one course of 3 to 5 contact hours, whereas full-time staff taught 18 regular day contact hours and one to three evenings per week in 1940 and 12 hours (or a maximum of 15 hours for "old contract" staff), less research and other released time equivalents in the 1970's.

Figure 2.7
DAY SENIOR PLACEMENT SURVEY
BY ENGINEERING JOB FUNCTION

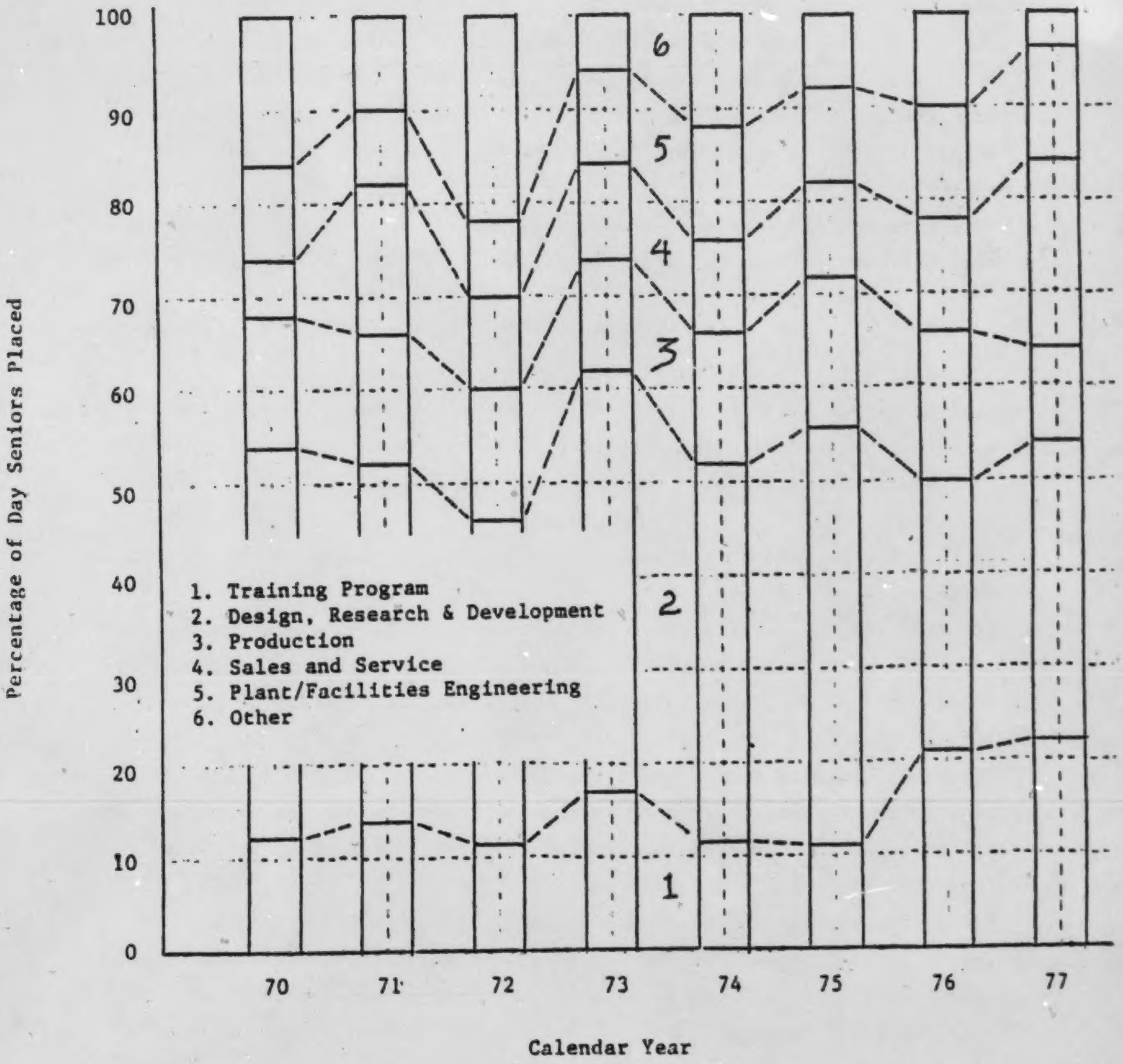


Figure 2.8

SENIOR JOB PLACEMENT SURVEY BY TYPE OF EMPLOYER

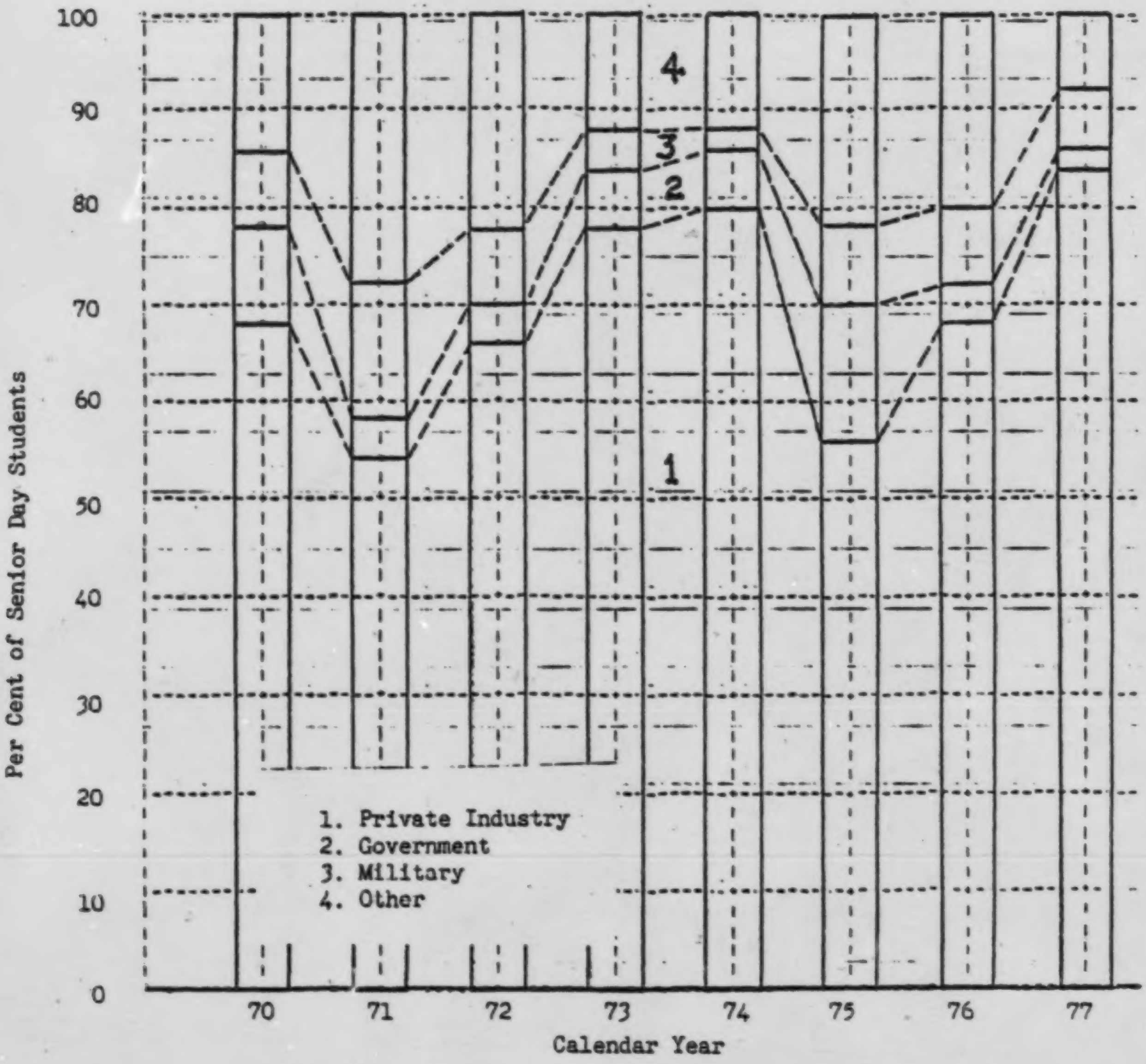


Figure 2.9

PER CENT OF B.S. GRADUATES ENTERING FULL-TIME GRADUATE STUDY

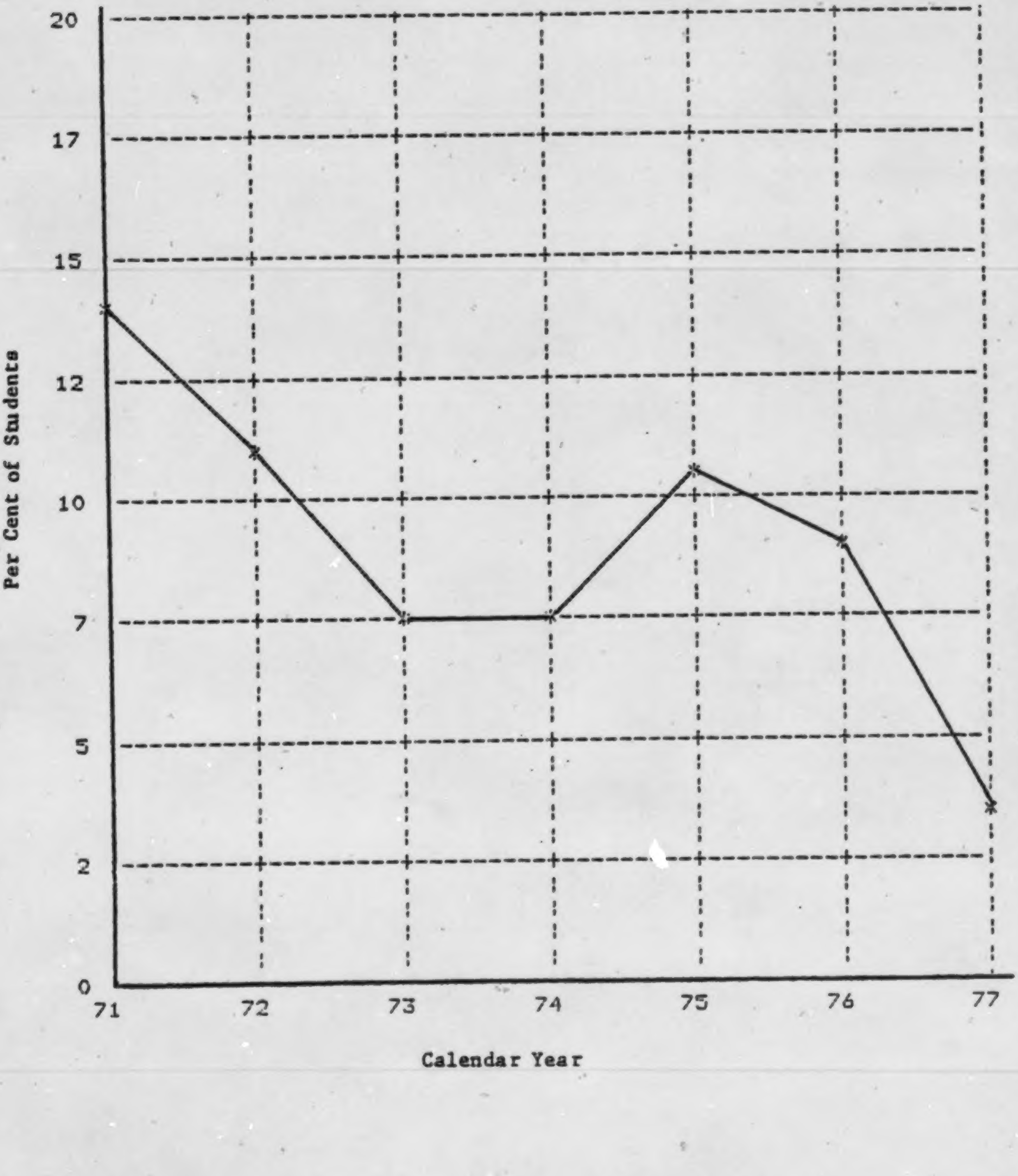


TABLE 2.10 FULL-TIME FACULTY
BY ACADEMIC DEPARTMENT

	1961	1971	1977
Architecture	—	—	22
Chemical Engineering	10	12	39
Chemistry	14	24	
Civil & Environmental Engineering	8	25*	29
Computer & Information Science	—	6	12
Electrical Engineering	21	36	31
Health, Phys. Ed. & Athletics	3	3	3
Humanities	14	38	24
Industrial & Management Engrg.	8	12	13
Mathematics	16	33	24
Mechanical Engineering	19	37**	31
Organizational & Social Sciences	—	11	17
Physics	29*	30	26
Other	16	5	—
Total	158	272	271

* Include 6 in Applied Mechanics, transferred from Physics to CEnE.

**Includes 7 in Engrg. Graphics, a separate department in 1961.

Does not include Aerospace Studies.

TABLE 2.11 FULL-TIME FACULTY BY ACADEMIC RANK

YEAR / RANK	INSTRUCTIONAL FACULTY - 1970-1977						
	1970	1971	1972	1973	1974	1975	1976
Professor	67	69	66	66	73	71	72
Associate Professor	92	97	91	92	94	93	88
Assistant Professor	68	65	68	55	49	73	61
Instructor	46	47	46	27	22	10	4
Special Lecturer	8	9	1	0	—	2	7
TOTAL	281	287	272	240	238	249	232

N.B. - Administrators with professorial rank not included
Does not include Aerospace Studies

In its early years, most of the Institute's faculty members were engineers, including many who taught in the mathematics and physics departments. Gradually, as engineering programs broadened in content, and as NJIT's mission expanded in non-engineering areas such as architecture, the expertise of the faculty broadened also, with the result that today there are slightly more non-engineering than engineering faculty.

In the beginning the BS was virtually a terminal degree in engineering, and as a consequence, few faculty had advanced degrees. In the thirties, masters degrees and/or professional licensure became necessary, and in the late forties doctorates became necessary for promotion of younger faculty. Today, except for architecture in which the MS is accepted as the terminal degree, a relevant doctorate is required for promotion to Associate Professor.

4. FACILITIES AND FINANCE

BUILDINGS

Newark Technical School began in a leased building at 21 West Park Street in downtown Newark. In 1877 it had completed construction and moved into the original Weston Hall at 376 High Street (on the site of its present campus), a building which probably encompassed some 25,000 square feet, and which was demolished in 1959.

Table 2.12 indicates the subsequent construction of buildings, all of which remain in use today except for the former Tiernan Hall at 240 High Street. It should be noted that 64 per cent of the total floor area, built during the 1964-1969 expansion program, was needed to relieve gross overcrowding of the 1960's enrollment in the then existing programs.

TABLE 2.12 BUILDING PROGRAM 1900-1977

YEAR	BUILDING	GROSS AREA SQ. FT.
1911	Colton Hall	*63,000
1926 1930	Campbell Hall Campbell Hall Annex	43,000
1947	Colton Hall Annex (*Incl. Above)	
1948	Eberhardt Hall	34,000
1956-1977	Original Tiernan Building	(52,000)
1958	Cullimore Hall	75,000
1960	(New) Weston Hall	74,000
1966	Faculty Memorial Hall	95,000
1966	The Center Student Alumni	81,000 10,000
1966	Entwisle Phys. Ed. Bldg.	53,000
1967	Library-Humanities Bldg.	65,000
1967	Specht Maintenance Bldg.	15,000
1973	(New) Tiernan Hall	171,000
1977	200 Central Avenue (Bleeker)	58,000
TOTAL		837,000

LIBRARY

The Library, originally in a second-floor room of old Weston Hall, was greatly enlarged when the new Weston Hall was built in 1960. In 1967 the library was moved to its present quarters during the campus and building expansion program of 1964 - 1969. As the programs of the Institute increased in breadth and depth, so did the book and periodical collection. Specifically, domestic and foreign research journals were added in the 1960's, and architecture publications in the mid-1970's.

COMPUTER

The Institute's centralized computing service facility was established in 1961, employing an IBM Model 1620 digital computer. This machine was later supplemented by an additional 1620. In 1968 the Computer Science Department was established. The IBM machines were replaced over the years by a series of 3 increasingly larger RCA (now UNIVAC)computers, the present machine being a UNIVAC Model 70/3 virtual memory machine, augmented by a separate remote job entry batch system tied through high-speed communications link to the New Jersey Educational Computer Network (NJECN) IBM Model 370/168 at Piscataway, New Jersey.

In 1976 a tri-partite planning effort among NJIT, NJECN, and the Department of Higher Education culminated in a five-year master plan for the development of a northern node of the network to be located at NJIT which will greatly increase the scope of student, research, and administrative computing at the Institute.

FUNDING

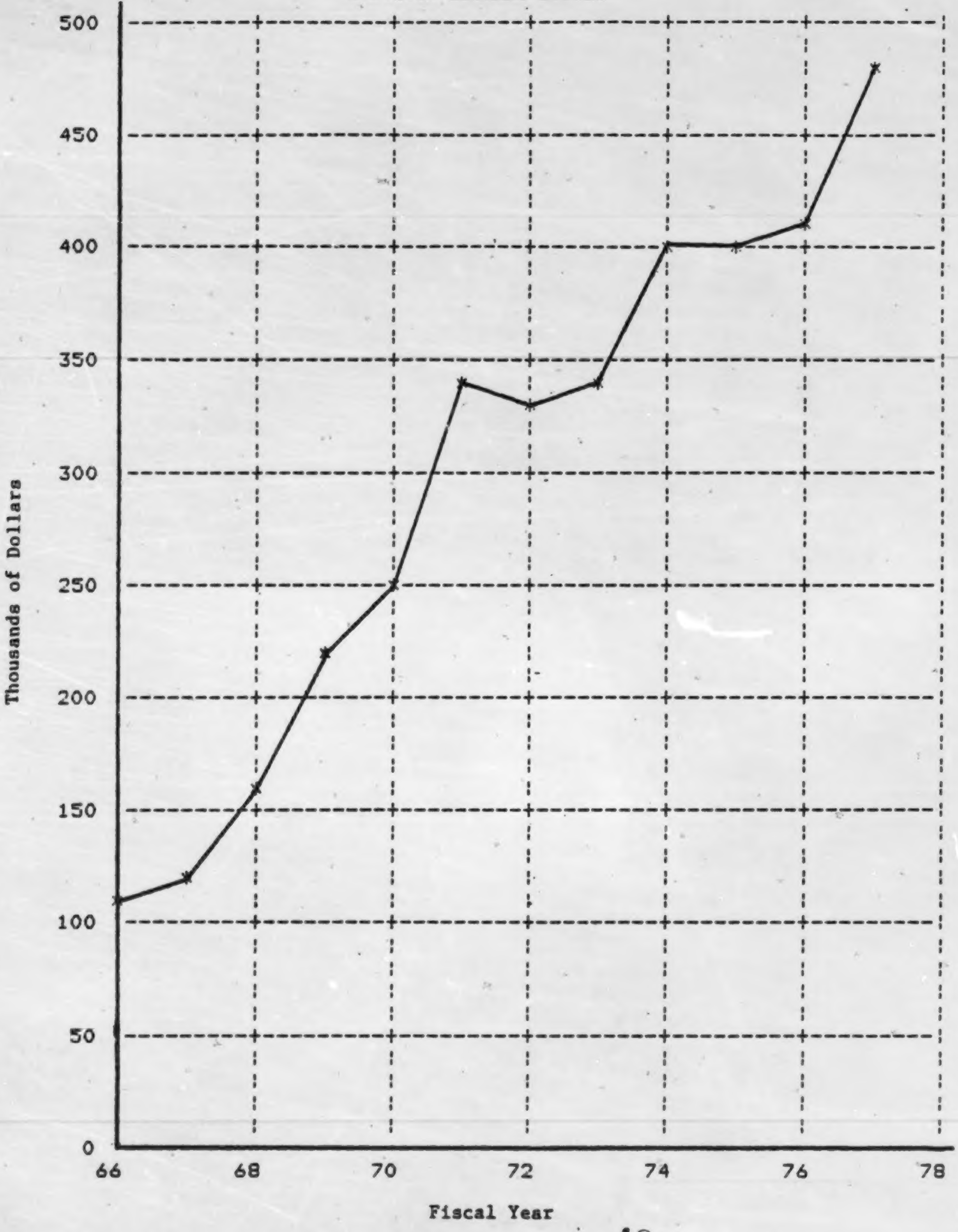
Historically, the Institute was funded by tuition, by the city of Newark, and by the State of New Jersey. The original legislation called for a 50/50 sharing between city and state. As the proportion of out-of-city students to Newark students increased, the state assumed an ever greater share of support, and the Institute took on more and more the aspects and attributes of a New Jersey state institution, but distinctly different from the eight state colleges on the one hand and Rutgers, the State University, on the other.

TABLE 2.13 NJIT LIBRARY STATISTICS, 1960-1977

	1969	1970	1971	1972	1973	1974	1975	1976	1977
Volumes in collection	63,711	71,235	79,213	83,997	89,758	97,781	102,594	107,299	114,064
Periodical subscriptions	1,157	1,203	1,301	1,301	1,267	1,468	1,537	1,458	1,487
Reels of Microfilm	777	1,106	1,865	1,938	1,986	2,068	2,160	2,335	2,418
Space (square feet)	29,500	29,500	29,500	29,500	29,500	29,500	29,500	29,500	29,500
Staff members (FTE)	13.5	17	17	17	16.2	16.2	16.6	14.1	18
Materials budget	91,051	104,572	101,842	90,454	122,778	159,375	129,149	140,890	163,085
Total operating budget	215,777	274,557	342,275	329,760	340,375	400,523	401,182	409,091	481,452

Figure 2.10

N.J.I.T. LIBRARY BUDGET



In recent years the growth of an enthusiatic alumni body and the establishment of the Foundation at NJIT has brought the Institute other sources of funds.

Table 2.14 compares Institute operating income for fiscal 1977 with that for 1972.

CONCLUSION

In its development throughout the years, NCE/NJIT:

- Has become one of the nation's largest engineering schools, providing vitally needed professionals for New Jersey industry.
- For many years has been the only New Jersey College to offer full regular degree programs to the part-time employed student through evening courses.
- Has built an enviable record for graduating broadly educated but practice-oriented engineers for industrial and research laboratory employment.
- Has enjoyed national recognition for its emphasis on the humanities and social sciences in its technological curricula.
- Has earned national recognition for its pioneering work in guidance counseling of its students and for working with guidance officials in New Jersey's secondary schools.
- Has aroused national interest in the outstanding success of its Engineering Opportunities Program for minority students.
- Has graduated the first woman with a B.S. in Chemical Engineering in the nation (1930), and, until the last decade, was the only engineering college in the state to admit women.

TABLE 2.14 NJIT OPERATING INCOME

	PAST		CURRENT	
Source	1971-1972		1976-1977	
	Amount($)	%	Amount($)	%
Tuition Fees	1,954,174	17.3	3,692,000	21.7
Other Student Fees[1)]	403,213	3.6	388,000	2.3
Endowment	37,308	0.3	73,000	0.4
Voluntary Public Support	14,654	0.1	225,000	1.3
State Support	8,471,484	74.8	11,721,400	68.7
Municipal Support	30,000	0.3	—	
Extramural Research Grants and Contracts	112,479	1.0	—	
Miscellaneous Income	211,752	1.9	352,000	2.1
Federal Appropriation	82,463	0.7	599,000	3.5
Totals	11,317,527	100	17,050,400	100
Full-time equivalant undergraduate students[2] associated with the above data	3,721		3,272	
Full-time equivalent graduate students[2] associated with the above data	358		405	
Full-time equivalent faculty[3] associated with above data	312		267	

1) Fees for instruction only.

2) Full-time equivalent student:

Undergraduate = 32 credit hours/year

Graduate = 24 credit hours/year

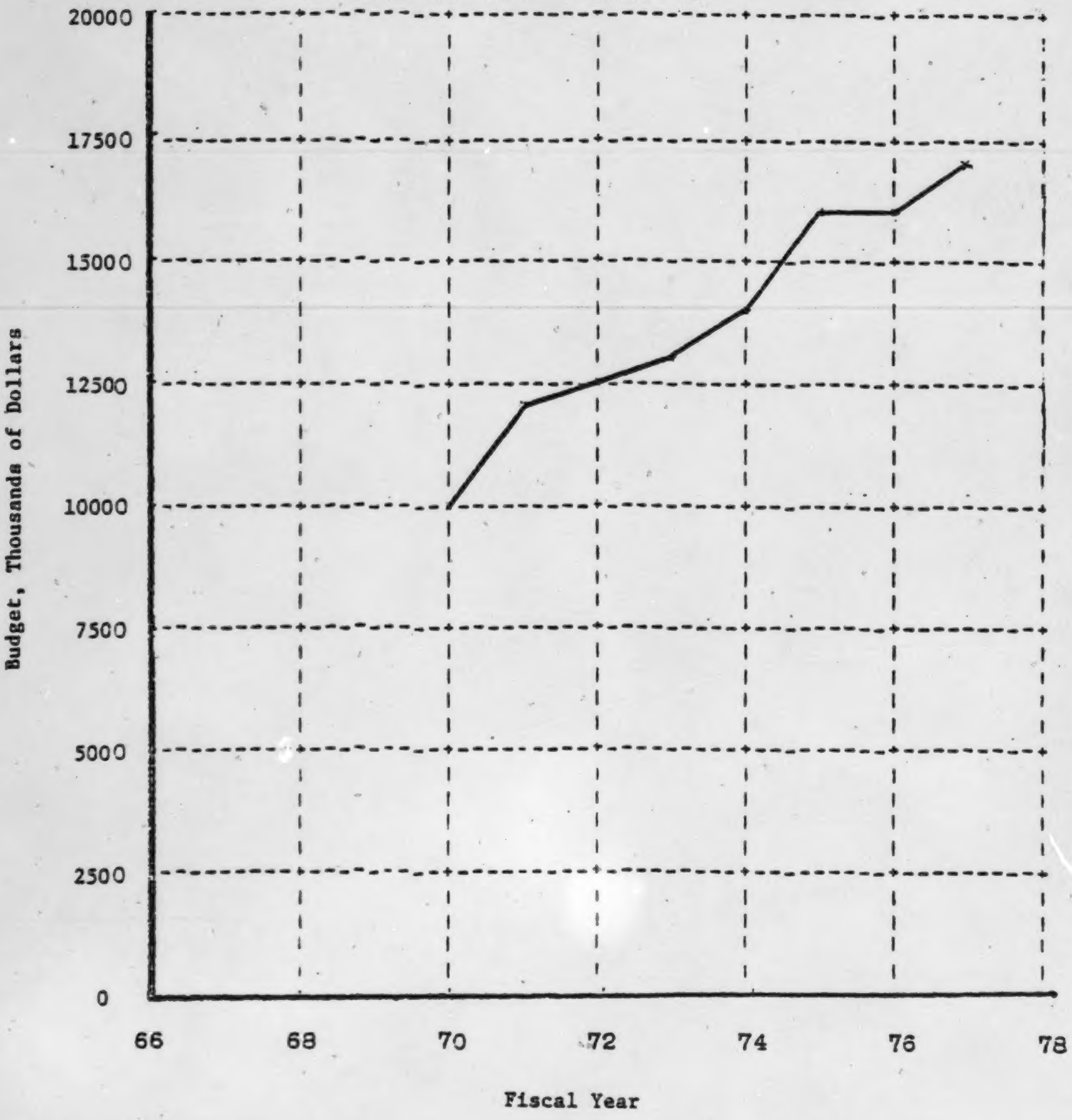
3) Full-time equivalent faculty member:

= 24 contact hours/year

Source: Report prepared for ECPD accreditation May 2, 1977.

Figure 2.11

N.J.I.T. TOTAL BUDGET FY '70 TO FY '77



CHAPTER III THE STUDENT POPULATION

All institutions of higher education face a major challenge in the decade ahead as their student populations change. Demographic data at the national and State levels project a decline in the high school graduating class that has traditionally been the primary source of full-time day undergraduate students. Patterns of graduate education in engineering and related fields are changing, with an increasing emphasis on part-time study. The demand for continuing education for practicing engineers and architects has increased. The growing interests of women and minority students in professional education require thoughtful attention. New Jersey Institute of Technology must plan carefully to meet the needs of a changing student population and to maintain the vitality of its academic programs. Much of this Master Plan addresses the challenge of serving an increasingly diverse student body. This chapter provides background information on the changes occuring in our student population.

1. THE CURRENT STUDENT POPULATION

Although its academic programs focus on the technological enterprise, the Institute serves an increasingly diverse student population. This diversity has been growing as new academic programs are added and as demographic patterns change.

In its undergraduate programs, the Institute has traditionally served the sons and daughters of working class families whose parents often have not attended college. Although this pattern has shifted somewhat as children of World War II veterans reach college, we will continue to serve an economically and socially upwardly-mobile segment of society.

In an effort to serve the inner-city population more effectively, we have extended our educational efforts, to pre-college students and teachers. Summer and academic year programs encourage high school students to consider technological careers while providing them with the academic background necessary for success. To improve the quality of science education in secondary schools, the Institute is increasing its effort toupdate and upgrade the subject-matter background of science and mathematics teachers.

The Institute offers a broader range of part-time evening undergraduate programs in technological fields than any other institution in the state. The student population for these programs is generally older and employed full-time. While enrollments in evening engineering programs have declined over the last decade, they seem now to be stabilizing. Enrollments in technology and other newer evening programs are still growing. The Institute's commitment to the part-time student, who may not be able to afford full-time study, will remain strong.

The Institute's graduate programs have traditionally focused on the needs of the employed professional, and it is expected that this emphasis will continue. Although such students span a broad age range, there is a concentration of recent graduates who are pursuing the M.S. part-time while employed full-time. As a result, graduate enrollments tend to follow the employment patterns of New Jersey industry. Although the recent recession caused a drop in enrollments, the current strong job market should lead to a recovery. The full-time graduate student population will become more diverse in the decade ahead as programs in computer science, management, and architecture develop. The needs of the employed professional are also addressed by our wide-ranging and growing efforts in continuing education.

Characteristics of Entering Freshman

Since most of our student population is concentrated in the undergradaute day program, it seems appropriate to examine characteristics of these students in depth. Over 90% of NJIT entering freshmen are young (18-19 years old) and recent high school graduates. In the graduating Class of 1981, 91.3% are male and 8.7% are female. This discrepancy is even greater when only engineering majors are considered. Approximately 95% of these are male and 5% are female, whereas among the 171 non-engineering majors women make up 17% and men 83%. Over 80% of NJIT entering freshmen described themselves as white/Caucasian, which is consistent with 1977 national norms for college freshmen. Compared with entering freshmen nationwide, a slightly higher proportion of NJIT students came from college preparatory high school programs, as shown in Table 3.1. Moreover, NJIT freshmen were a bit more likely than those nationwide to have had moderately good school records (average grade in B range) rather than very good (A) or poor (C/D) records. Predictably, NJIT entering freshmen, more often than students nationwide, reported very good high school preparation in the math/ science area.

TABLE 3.1

ACADEMIC BACKGROUND OF NJIT ENTERING STUDENTS

Compared to

ENTERING STUDENTS NATIONWIDE: 1976 & 1977

	PERCENTAGES			
	NJIT		NATIONAL NORMS	
	1976	1977	1976	1977
High School Program:				
College Preparatory	97.6	95.6	91.2	88.8
Other	2.4	4.4	8.8	11.2
Good High School Preparation in:				
Mathematic Skills	51.2	46.9	30.7	29.7
Science	46.7	48.6	35.9	34.3
Reading and Composition	17.1	21.8	33.8	34.9
Average Grades in High School				
A or A-	21.9	17.9	24.0	22.3
B- through B+	69.8	70.8	61.9	61.3
C or C+	8.3	9.7	13.9	16.5

Consistent with the age of entering freshmen, over 98% of both the NJIT and nationwide groups reported that they were unmarried. Approximately 93% of NJIT freshmen live within 50 miles of the college and a comparable percentage plan to live with their parents during their first semester at college. However, only 39.1% reported preferring residence with parents or relatives, the remainder favoring another arrangement, such as college dormitories (25.2%) or other residence (23.5%).

Most 1977 NJIT entering freshmen (60.8%) estimated family income to be in the $10,000 to $20,000 range, as indicated in Table 3.2. Thus, family incomes of NJIT freshmen are comparable to national norms in most income levels of $30,000 or above. The 1977 NJIT freshman class also reported a greater proportion of family incomes in the $20 - $30,000 range than the 1976 NJIT class.

TABLE 3.2

FAMILY INCOME OF NJIT ENTERING STUDENTS VS. NATIONAL NORMS: 1976 & 1977

	PERCENTAGES			
	NJIT		NATIONAL NORMS	
	1976	1977	1976	1977
Under $10,000	20.6	16.3	20.3	20.7
$10,000 - $20,000	49.6	44.5	39.2	36.7
$20,000 - $29,999	22.2	30.0	21.6	23.2
Over $30,000	7.6	9.2	19.0	19.3

Over 90% of NJIT entering freshmen indicated that NJIT was their first or second choice, which is consistent with attitudes of freshmen nationwide toward their respective schools. In comparison with national norms, NJIT students tended to be somewhat more practical in their reasons for attending college, emphasizing jobs and money above general educational/cultural goals as shown in Table 3.3. The school's academic reputation and low tuition were students' most prominent reasons for selecting NJIT, and the former was also important (although proportionately less so) to students nationwide.

In view of the specific emphases of the NJIT curricula, it is not surprising that over 80% of the entering group expected to major in engineering and eventually to work as engineers. Also predictable was the relatively low proportion of undecided majors among NJIT freshmen (0.8%) in contrast to entering freshmen nationwide (5.9%).

When students were asked about future educational goals, 51.5% of NJIT freshmen indicated plans to complete at least a Master's degree, a somewhat higher proportion than the national norm of 34.2%.

TABLE 3.3

COLLEGE CHOICE: COMPARISON OF NJIT FRESHMEN WITH NATIONAL NORMS: 1976 & 1977

	PERCENTAGES			
	NJIT		NATIONAL NORMS	
	1976	1977	1976	1977
Reasons for going to college:				
Better job	76.3	79.9	67.3	74.7
Make more money	71.6	72.0	49.1	58.9
Learn more about things	68.0	69.9	74.6	80.6
Gain general education	47.0	53.1	67.4	73.9
Become more cultured	23.3	26.1	36.1	42.5
Reasons for selecting this college:				
Academic reputation	71.8	67.7	50.3	52.0
Low tuition	50.7	51.6	11.8	15.3

NJIT entering freshmen report high school grades comparable to national norms, more certainty about choice of college major and career, and better high school preparation in the math/science area. However, they seem to have less confidence in their potential for high levels of academic success. For example, in comparison with freshmen nationwide, a smaller proportion of our students expect to achieve a B average in college or graduation with honors, while a larger proportion report poor high school preparation in study habits and anticipate a need for tutoring and for remedial coursework in the sciences.

Although our students report they are less likely to transfer to another school than students nationwide, they also anticipate less satisfaction with college. These inconsistencies between goals and anticipated achievement suggest that college success for many NJIT freshmen might be greatly influenced by supportive services including counseling and tutoring which would help students clarify personal goals, compensate for academic deficiencies, and cope with the rigorous NJIT curricula.

TABLE 3.4

SELF-PERCEPTIONS AMONG NJIT FRESHMEN (COMPARED TO FRESHMEN NATIONWIDE) REGARDING: GOALS, BACKGROUND, AND ANTICIPATED ACHIEVEMENT

	PERCENTAGES			
	NJIT		NATIONAL NORMS	
	1976	1977	1976	1977
Good High School Preparation:				
Math	51.2	46.9	30.7	29.7
Science	46.7	48.6	33.8	34.3
Study Habits	9.9	10.0	19.8	16.5
Anticipated graduation with honors	8.8	9.4	11.7	13.2
Remedial coursework/science	not avail.	19.5	not avail.	11.6
Anticipated need for tutoring	15.0	13.1	9.0	9.7
Anticipated transfer to another college	6.5	7.6	14.2	12.7
Anticipated satisfaction with college	43.8	47.8	53.6	55.1
Make at least a B average	29.4	36.4	42.6	39.9

Data for the 1976-77 academic year show that 23% of NJIT's freshmen withdrew for academic reasons. (142 academic dismissals from a total class of 626). Academic withdrawals for the total undergraduate student body, including freshmen, amounted to 344 students, or roughly 13% of the total. Illnesses, personal problems, and financial difficulties follow academic difficulties in rank order as reasons for undergraduate withdrawal from NJIT. The total number of undergraduate withdrawals for the 1976-77 academic year from NJIT was 472 or about 15% of the student body.

More detailed data on high school rank and standardized test scores of NJIT freshmen is found in the Appendix, pages A3-1 through A3-3.

2. TRENDS IN STUDENT POPULATION

Enrollment patterns in the various academic programs in the Institute are examined in Chapter 4. In this section, the factors influencing our enrollments are reviewed.

The Demographic Prospect

In maintaining its undergraduate enrollments, NJIT faces two related demographic challenges. The anticipated decline in the high school graduating class is well-known. More subtle are the population shifts in counties of northeastern New Jersey that the Institute has traditionally served. The white ethnic population of the urbanized counties has been shifting south and west into suburban areas more distant from Newark. At the same time, the minority population of the urbanized counties has grown.

The effects of population shifts, coupled with the decline in high school graduates is shown in Table 3.5, which reports that the high school graduate pool in counties where the Institute has traditionally drawn its undergraduates may drop as much 18 per cent by 1990. All counties listed show a decrease in the 15-to-24 age group between 1980 and 1990 (Column 2), whereas many of the same counties showed a substantial increase in that age group between 1970 and 1980 (Column 4). If NJIT were to draw only from its traditional population and geographic area, its undergraduate enrollments might drop to 82 per cent of current levels by 1990 (Column 3).

As mentioned earlier, graduate enrollments are more a function of economics than demographics, at least in the short term. Of course, if the number of college graduates in the technological fields available at the Institute were to decline, it would affect our graduate enrollments adversely. But the health of New Jersey industry is probably a more important determining factor in our part-time graduate students who currently make up the bulk of our graduate enrollments.

Factors Mitigating the Demographic Trends

There appear to be several factors which will reduce the impact of the declining high school enrollment and population shifts. If the Institute can take advantage of the factors in a timely way, it will be possible to avoid the enrollment decline that otherwise may occur in the decade ahead.

Table 3.5

PROJECTIONS of NJIT POTENTIAL FOR ENROLLMENTS FROM TRADITIONAL SOURCES

County	(1) 1974 Per Cent of Total Enrollment	(2) 1980-1990 Projected Change Ages 15-24*	(3) 1990 Per Cent of Total Enrollment**	(4) 1970-1980 Projected Change Ages 15-24*
Bergen	12.42%	0.768	9.54%	1.36
Essex	27.05%	0.780	21.10%	1.07
Hudson	8.10%	0.835	6.76%	0.99
Middlesex	8.20%	0.936	7.68%	1.58
Monmouth	3.82%	0.832	3.18%	0.96
Morris	8.57%	0.765	6.56%	1.80
Passaic	7.67%	0.844	6.47%	0.99
Somerset	2.84%	0.861	2.45%	1.73
Union	11.82%	0.742	8.77%	1.25
Out of State	4.27%	1.000#	4.27%	—
Other NJ	5.24%	1.000#	5.24%	—
	100.00%		82.02%	

*From County Age-Cohort Population Distributions - Tri-State Regional Planning Commission, August 1975.

**Column 1 multiplied by Column 2.

#Assumed to be no change for purposes of this tabulation.

1. There is a growing interest in career education at the college level. With the increasing emphasis on career education among college students, we believe that the Institute's emphasis on education for professional careers will enable it to run counter to demographic trends. Although the engineering job market fluctuates with the state of the national economy, it always remains among the strongest of any college field, even during a recession. The strong current engineering job market has led to the highest salaries among college graduates and to record engineering enrollments nationally. The job market for graduates of the Institute's newer programs varies considerably. Technology, although as strong as engineering, offers slightly lower starting salaries. Computer science is probably stronger than engineering. Architecture is dependent on the vitality of the construction industry, which is recovering more slowly than other segments of the economy. In spite of this less attractive employment picture, the architecture program still finds it necessary to restrict its freshman enrollment, drawing from a large pool of qualified applicants, apparently because of intrinsic interest in the field and strong long-term prospects for the architecture profession. With an intensified recruiting effort, we hope to attract a greater fraction of the shrinking high school population.

2. There is a continued strong job market in the professional fields offered at NJIT Although it is very difficult to predict long-range employment trends because of economic uncertainties, the U.S. Department of Labor figures, as reported in Table 3.6, show a continued strong demand for the technological professions. With an average growth rate in employment in all occupations of 20 per cent from 1974 to 1985, the occupations prepared for at NJIT show generally higher levels of growth. Engineering overall shows a 25 per cent growth, while some of NJIT's newer programs show an even more spectacular growth, on a percentage basis. It should be noted that because engineering is the largest of the professions listed in Table 3.6 the 25 per cent growth actually represents a greater numerical increase in employment than any of the other fields listed.

The U.S. Department of Labor reports similarly optimistic data on job market in New Jersey for the technological professions, as summarized in the Appendix (Tables A3.4 and A3.5). These tables show a greater number of openings in the technological fields than New Jersey institutions of higher education are prepared to supply. For example, annual job openings in engineering in New Jersey average 1843, but in 1976 New Jersey engineering colleges graduated only 1057 students with B.S. degrees. Increases in engineering enrollments will move

Table 3.6

U.S. EMPLOYMENT BY OCCUPATION, ACTUAL 1974, AND PROJECTED FOR 1985

(In Thousands)

OCCUPATION	EMPLOYMENT 1974	EMPLOYMENT 1985	PERCENT CHANGE 1974-85
All Occupations, Total	85,936	103,355	20
Engineering, Technical, Total	1,168	1,460	25
Chemical	50	62	24
Civil	167	225	35
Electrical	287	374	30
Industrial	193	224	16
Mechanical	183	234	28
Life and Physical Scientists, Total	229	282	23
Chemists	121	145	20
Physicists and Astronomers	22	29	29
Mathematical Specialists	43	59	39
Engineering and Scientific Workers	915	1,277	40
Computer Specialists	308	476	55
Computer Systems Analysts	97	160	65
Architects	78	110	40
Personnel and Labor Relations Workers	325	450	38
Bank Officers and Financial Managers	478	705	47
Health Administrators	150	250	67

Source: Bureau of Labor Statistics, U.S. Department of Labor, November, 1976.

the supply closer to the demand, but it is unlikely that New Jersey engineering colleges will ever meet the demand. Obviously, this comparison can be made only on a general level, since not all engineering college graduates stay in New Jersey; and New Jersey industry regularly recruits out of state. Nevertheless, the indicated shortage of engineering graduates could lead to an exodus of high-technology industry, to areas where engineers are more plentiful.

If current off-shore oil exploration proves successful, the resulting industrial growth could lead to an even greater shortfall of engineering graduates in New Jersey.

The situation in architecture is even more disparate. The New Jersey School of Architecture expects to turn out 75 graduates a year, whereas the average annual job openings in New Jersey is predicted to be 739. (Princeton's small architecture program will not make up the difference, even if its graduates were to remain in New Jersey.)

We believe that the growing disparity between supply and demand for engineers and other technological professionals will cause a greater fraction of the shrinking high school population to choose these fields as they enter college. This trend is already evident nationally and in New Jersey.

3. The Institute's newer degree programs have not yet reached their full potential for enrollment. While the well-established engineering programs at NJIT have followed the fluctuating national enrollment patterns created by exaggerated reports of engineering unemployment at the beginning of the recession of the early 1970's, enrollments in our newer degree programs have continued to grow. At the present time, the newer programs account for about 1/3 of our undergraduate enrollment. Detailed data on enrollment patterns is presented in Chapter 4. These data suggest that our total enrollment may well run counter to demographic trends. Programs not yet developed will attract additional students.

4. The introduction of cooperative education and an integrated 5-year M.S. in several degree programs will attract additional students. These optional programs which are described in Chapters V and VI, should give NJIT a competitive advantage, particularly in engineering.

5. More women are choosing careers in the technological professions. Nearly all of the Institute's academic programs have traditionally attracted a predominantly male student population. New career options for women have made the Institute's programs much more attractive, but a major effort must be made to attract women to NJIT. As a case in point, much of the recent increase in

engineering enrollments nationally is due to a dramatic increase in women engineering students. A renewed admissions effort must demonstrate the relevance to women of an engineering education.

6. Minorities are seeking parity representation in engineering and other technological professions. Although the Institute developed a national reputation as a pioneer in encouraging minorities into engineering education, much remains to be done if we are to serve the minority population of northern New Jersey effectively. Minority representation must be increased in all the Institute's degree programs. While continuing to serve our traditional population, which has moved to the suburbs, we must develop effective ways of serving the new population of the urban centers. Increasing service to inner-city students will compensate for shifts of our traditional population. At the same time, the demographic decline in the high school population will be less among minorities.

Finally, we shall seek to attract more out-of-state students from such nearby areas as Staten Island and Rockland County.

3. THE INSTITUTE'S RESPONSE TO THE DEMOGRAPHIC CHALLENGE

While some of the mitigating factors mentioned above are largely beyond the Institute's control, we cannot adopt a passive attitude and expect them to maintain our enrollments in the face of demographic trends. On the contrary, the Institute must launch a major effort to maintain and increase our enrollments. This effort will involve many segments of the Institute community. The image of the Institute in the eyes of the general public and the business/industrial community must be improved. The academic programs must be tailored to future student needs, with remedial work provided as necessary, so that the Institute can serve a broader range of students without altering graduation standards. These concerns will be addressed in the following chapters. Even though we have a good image and attractive academic programs, the Institute must still carry the word to potential students through an intensified admissions effort.

Admission Activities

It will be important to continue to focus our admissions activities on the Institute's strengths, particularly our close working relationship with high school faculties and staffs, and our longstanding record of service to students and to the State of New Jersey.

The Admissions Office has in the past, changed its recruiting efforts and approaches to accommodate changes in the geographic location, and in the student body. It will be important to continue activities which provide information to students and develop their interest in attending NJIT. These activities include high school and two-year-college visits, presentations at college nights, preparation and distribution of printed material, posters, participation in Open House, telephone campaigns, direct mail campaigns and similar activities for students. We shall also continue to monitor demographic conditions, target high schools and two-year colleges, and follow-up on the success of students after they are admitted. The latter also permits us to report to sending schools on the success of their students and thereby improve the quality of counseling.

We continue to reach out to secondary school counselors and two-year college transfer counselors. It is important that secondary school counselors and two-year college transfer counselors are kept as informed as possible of the opportunities available at NJIT. Admissions activity in this regard should include inviting high school and two-year college counselors onto the campus to exchange information and report to the counselors on the success of their students, preparing materials for counselors, and preparing and distributing newsletters. Since these activities are important ones, it is felt that there should be increased communication with high schools superintendents, high school principals, as well as counselors, to make certain that notices of special events and releases of information are available to them. Since our response from two-year college transfer counselors is usually quite substantial, it seems unnecessary to look for a similar avenue of strengthening our approach within this population.

Perhaps the single most important effort which needs to be made during the next several years should be directed to convincing faculty of the importance of the role they can play in recruiting and to involving them in educational activities which have recruiting benefits.

The Admissions Office must continue to remain alert to all potential sources of students. Such populations include people who are currently employed by industry (for evening division), other evening students, handicapped students, mature learners, and second-career people. To attract such students to the Institute, we must make class hours more flexible, simplify admissions procedures, provide day care centers, and improve our facilities to the handicapped.

Because of the new dormitories we will be able to recruit students from geographic areas traditionally not served by the Institute. Therefore we will need to advertise and make visits to high schools in outlying areas.

Communications should be strengthened between the Admissions office and the various academic administrative offices to insure greater cooperation among all segments of the Institute. Such cooperative efforts could result in the reinstitution of the Joint Enrollment Program, in which students can be simultaneously enrolled for credit in their high schools and at NJIT in a limited program; the development of a greater number and/or a different type of non-credit offerings; improved program coordination with two-year colleges; and modification of entrance requirements.

An extremely important role for the Admissions Office is to continue to identify the academic and other needs of our enrolling students and to communicate those needs to the appropriate academic departments and support offices, such as Dean of Student Services. Such communication should lead to the development of appropriate programs in skills and other areas.

It is obvious that if Admissions is to be effective in attracting groups of students who are different from those in the past, the Institute must make itself available to these students. The admissions function should be one of identifying potential sources of students and communicating to others its impressions of changes which must be made in order to attract such students.

Off Campus Programs

Another approach toward meeting the demographic challenge posed by the shifting residential patterns is to bring to our students carefully selected segments of NJIT's programs in off-campus locations.

There are significant regions of New Jersey in which the programs offered by NJIT are not available but where there is reason to believe local demand exists. The MS program in computer science offered by the Institute on the Drew University campus represents recent recognition of a role in meeting this kind of educational need. NJIT considers itself to be a state-wide resource and proposes to explore in conjunction with other institutions, where appropriate, the development of cost-effective programs to meet such regional needs. Among others which will be explored are the following:

- Offering of engineering and technology programs in the southern part of New Jersey (possibly in conjunction with local county colleges).
- Offering of management, engineering and technology programs at Picatinny Arsenal* as the arsenal undergoes its planned personnel expansion (possibly in conjunction with other State institutions).
- Bergen County is an area presently not well-served by the Institute, primarily because of past transportation habits which lured commuting students to New York City if they did not wish to attend local colleges. It is a fertile area in which to offer selected NJIT programs which are not available within the County.

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*U.S. Army Research and Development Command, located near Dover, New Jersey.

Presently, NJIT offers two off-campus programs: a doctoral program in Electrical Engineering Communications at Fort Monmouth and the Master's program in Computer and Information Science at Drew University referred to above. Neither program is attracting the numbers of students anticipated when it was initiated. The Institute is conducting a study of these two programs to ascertain why they are not more successful. Some questions this study will try to answer are:

- Can an off-campus program on another college campus establish its own identity?
- Must off-campus graduate programs be accompanied by an off-campus undergraduate program in order to succeed?
- Should either of these programs be discontinued?

CHAPTER IV ENROLLMENT TRENDS AND PROJECTIONS

Enrollment projection is not an exact science. The demographic trends and other factors discussed in Chapter III that influence the composition of our student population certainly play an important role in determining enrollments over the next decade. Ideally, these data should logically lead to accurate estimates of future enrollments. But other less predictable factors are at work.

National and State policies on technology-intensive projects have a major impact on industrial activity and on engineering and technology enrollments. For example, the national policy that first initiated and later de-emphasized the space exploration program had substantial positive and negative impacts on engineering enrollments. Current emphasis on energy and environmental problems is an important contributing factor to the strong engineering job market of today.

The strength of the national economy has a direct influence on the Institute's enrollments. During a recession, new construction is curtailed, and jobs for civil engineers and architects suffer. Industry cuts back on its expansion plans; and fewer engineering and technology graduates are needed. While economic cycles and national priorities have substantial impact on enrollments at technologically-oriented institutions such as NJIT, there is no rational way of predicting these factors in advance.

Probably the most frustrating experience of logically-minded engineering educators is the illogical over-reaction of the college-bound student population to reports of weakness or strength in the engineering job market. In the early 1970's, engineering enrollments plummeted in response to a slight softening in the job market, while in the late 1970's engineering enrollments are booming in response to reports of high salaries and plentiful jobs. As a result, the relatively small Class of 1978 (who entered in 1974 when freshman were reacting negatively to the soft engineering job market) are much sought after. But the very large Class of 1982, attracted to engineering by the strong job market of 1978, may find a substantially different situation when they graduate. These over-reactions to the job market create cycles in engineering enrollments that are out of phase with employment patterns.

Given these great uncertainties, this chapter attempts to present conservative estimates of NJIT enrollments in the next decade, using all available quantitative and qualitative data. As indicated in Chapter III, various factors related to the Institute's new and established academic programs may make it possible for enrollments to run counter to general demographic trends. Hence the Institute may very well capture a somewhat larger fraction of the New Jersey college-bound population than at present.

In the remainder of this chapter, enrollments in the Institute's various undergraduate and graduate programs are examined and projected over the next decade. Finally, these estimates are summed to obtain an estimate of Institute size.

1. UNDERGRADUATE PROGRAMS

Since most of the Institute's student population is undergraduate, each undergraduate degree program will be considered individually.

Engineering and Engineering Science

Engineering continues to represent the largest undergraduate enrollment at NJIT. Although new programs are assuming increasing importance, engineering will continue to attract the majority of the student body in the decade ahead.

Nationally, engineering enrollments suffered a serious decline in the early 1970's, but have now recovered to reach an all-time high, as shown in Figure 4.1. Freshman enrollments are expected to reach a peak of 89,000 in 1978 and then fall back to 75,000 by 1983*. NJIT suffered a similar drop in engineering enrollments, although the decline started somewhat later and the recovery has not been as dramatic. Figure 4.2 shows that total engineering day enrollments dropped from an all-time high at 3000 in 1970 to a low of slightly less than 2000 in 1974. Since that time, a slow recovery has produced nearly 2200 day engineering undergraduates in 1977.

National engineering enrollments dropped about 23 per cent from the 1969 high to the 1973 low, and have since recovered 43 per cent to an all-time high in 1976. In contrast, NJIT's enrollments dropped about 33 per cent from a 1970 high to a 1974 low, and have recovered only 10 per cent by 1977. Obviously, new factors are operating to retard recovery of engineering enrollments at the

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*Alden, John "Engineering and Technology Enrollments, Fall 1976 Engineering Education, Vol. 68, Oct. 1977.

Institute. A major factor is the dramatic increase in Rutgers undergraduate engineering enrollments, from approximately 1200 in 1975 to over 1800 in 1977 and a projected 2200 in 1978.

In view of the changing competitive situation in New Jersey, we do not propose that engineering enrollments will ever return to the 1970 level. We believe, however, that the new cooperative program, the integrated M.S., and the proposed B.S. in Surveying will counteract any demographic decline. In addition, we believe that improved counseling and remedial efforts will improve retention. The projection for the next decade is therefore from the present level of 2100 to an optimistic 2600 if all favorable factors are operating.

As shown in Figure 4.3, evening undergraduate engineering enrollments have fallen from nearly 1000 in 1970 to somewhat over 500 in 1977. This trend is a continuation of a decline that started from a high of 1400 in the 1960's. Since NJIT has little competition in evening undergraduate engineering programs in New Jersey, this decline must be viewed as a fundamental change of college-going habits. We anticipate a leveling off of evening engineering enrollments at present levels, 500-600 headcount.

Examination of Figures 4.2 and 4.3 show major differences among the individual engineering programs. Civil Engineering showed a spurt of popularity when environmental concerns became a top national priority, but has declined since in response to a weak construction market. Chemical Engineering is currently showing a peak popularity, perhaps because of its central role in solving the nation's energy problems. The national boom in chemical engineering enrollments has created concern about a potential surplus of graduates around 1980. Mechanical Engineering suffered a decline, but is now recovering, again perhaps because of the energy crisis. The continued downtrend in Industrial Engineering reflects an unexplainable national decline. The drop in Engineering Science in 1972 is due to the separation of the Computer Science program.

Like the stock market, trends in engineering enrollments are easier to explain after the fact than to predict in advance. For this reason, no attempt is made to project enrollments in the individual engineering programs over the next decade, even though such trends have serious implications for faculty size in the various programs. We have managed to cope with the fluctuations up to now and expect to be able to do so in the future. Indeed, engineering faculties must be supported through cyclic variations in enrollments to maintain the long-term vitality of the academic and research programs.

Figure 4.1

NATIONAL TOTAL FULL-TIME UNDERGRADUATE
FALL ENGINEERING ENROLLMENTS

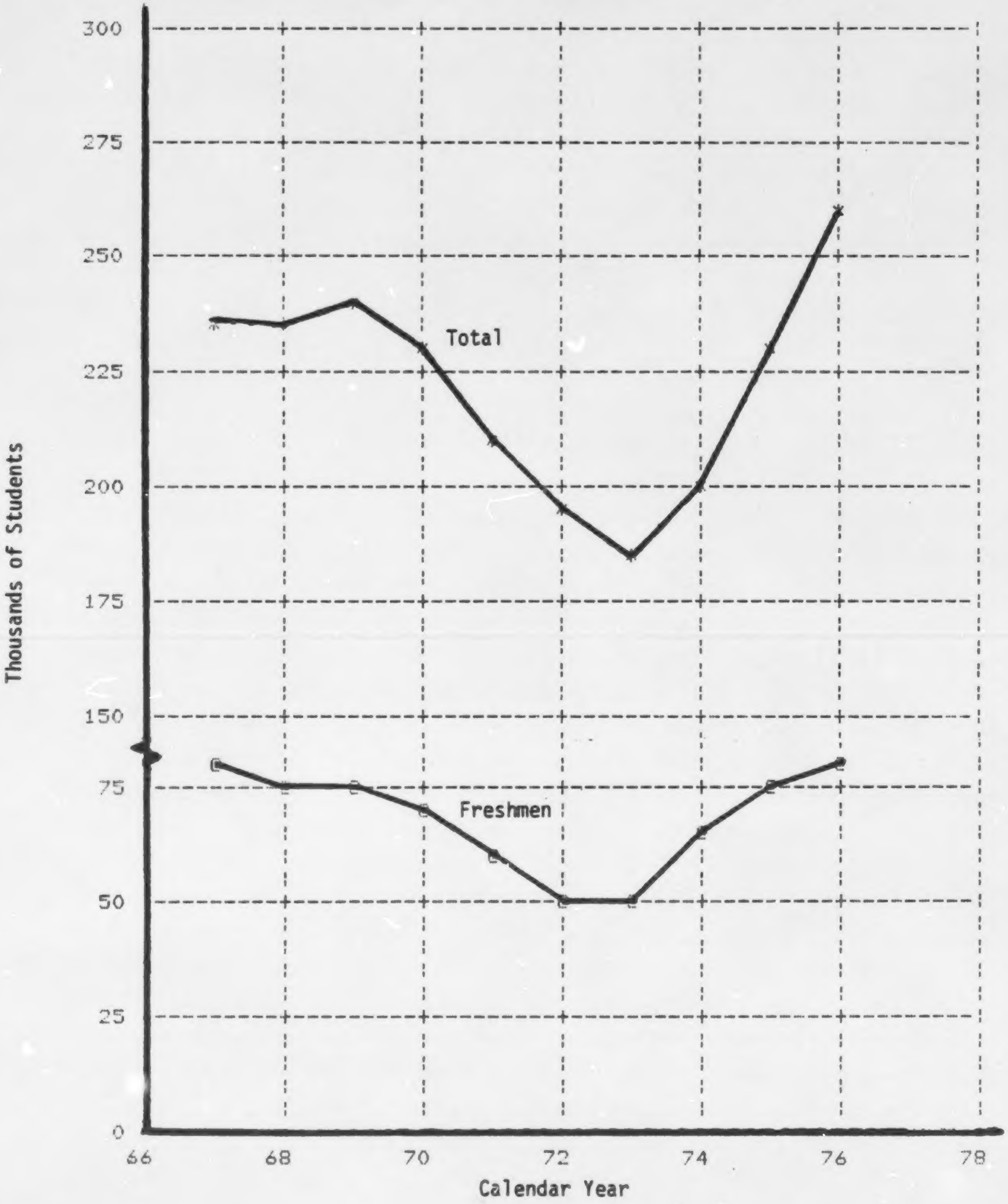


Figure 4.2

DAY UNDERGRADUATE ENROLLMENTS
ENGINEERING DISCIPLINES
(Fall headcount)

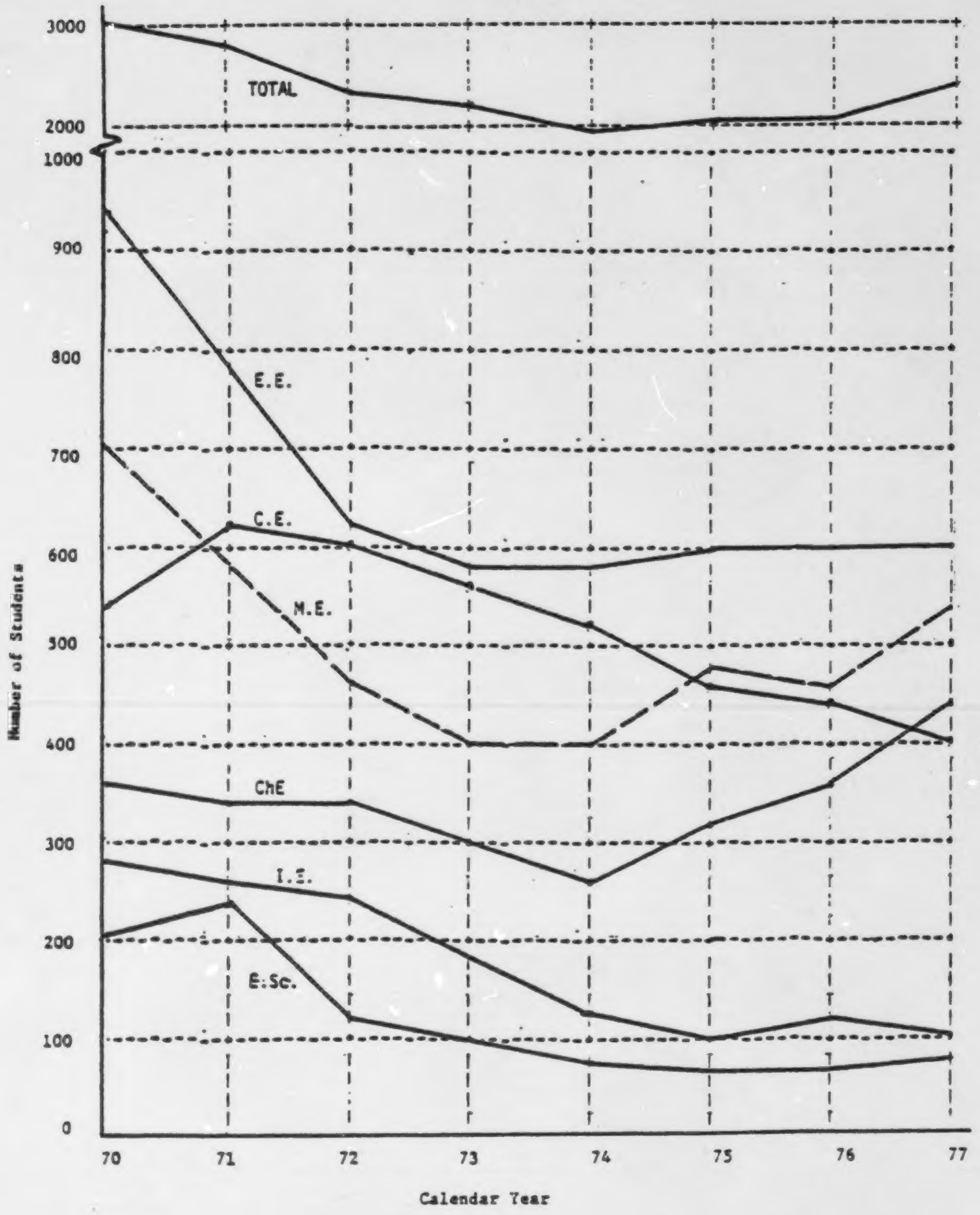
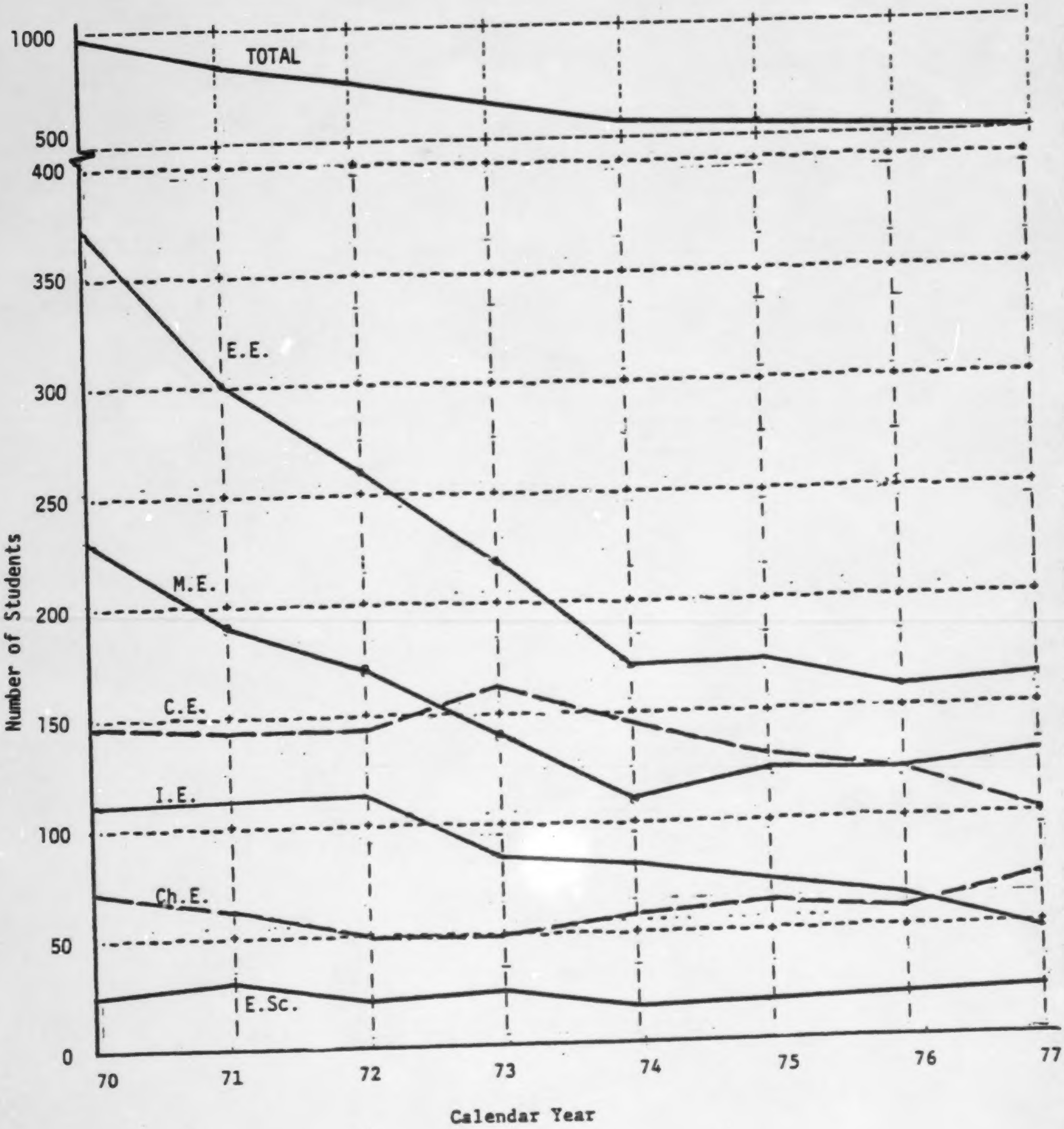


Figure 4.3

EVENING UNDERGRADUATE ENROLLMENTS
ENGINEERING DISCIPLINES
(Fall headcount)



Engineering Technology

The Bachelor's degree in Engineering Technology is a relatively new program, nationally and at NJIT. In contrast to engineering, technology enrollments have shown relatively steady growth since the inception of baccalaureate programs in technology about ten years ago, as shown in Figure 4.4. The Institute's BSET enrollments are given in Figure 4.5. Since we do not offer the first two years of the BS program, enrollments represent juniors and seniors. An unexpectedly large number of day juniors was admitted in the fall of 1975, apparently because a weak job market for community college associate degree graduates encouraged them to continue full-time study. This group's graduation in the spring of 1977 caused a drop in day technology enrollments to a more realistic level. Evening technology enrollments have continued to grow as the program reaches its full potential.

The lack of a full range of engineering technology programs in the county colleges of northeastern New Jersey has effectively limited access to our BS program for students from these counties. This situation not only reduces student options, it restricts growth of our technology programs. Our current explorations of a joint effort with Essex County College hopefully will provide pathways to the associate degree in the full range of engineering technologies, as well as greater access to our BSET program, for residents of Essex, Hudson, Bergen, and Passaic counties. This effort could have a substantial impact on our technology enrollment.

The rapid growth in the evening technology program has largely compensated for the drop in evening engineering enrollments. The technology programs have also provided teaching loads to engineering faculty as engineering enrollments declined.

Enrollment projections must recognize that the BSET program is still in an initial growth period, particularly in the evening. New options may be added to the present five, which are not yet up to a steady-state enrollment. If the favorable factors affecting enrollments are maximized, the technology program may grow to 275 full-time and 400 part-time students in the decade ahead. A pessimistic estimate would suggest a plateau of enrollments at approximately present levels, 150 full-time and 300 part-time students. If full access can be provided students in the northeastern counties, the maximum numbers are likely to be attained.

Enrollments in the Division of technology certificate programs fell from a 1970 level of 951 to a low of 501 in 1973. Intensive recruiting efforts and

Figure 4.4

NATIONAL FULL-TIME UPPER DIVISION
FALL B.S.E.T. ENROLLMENTS

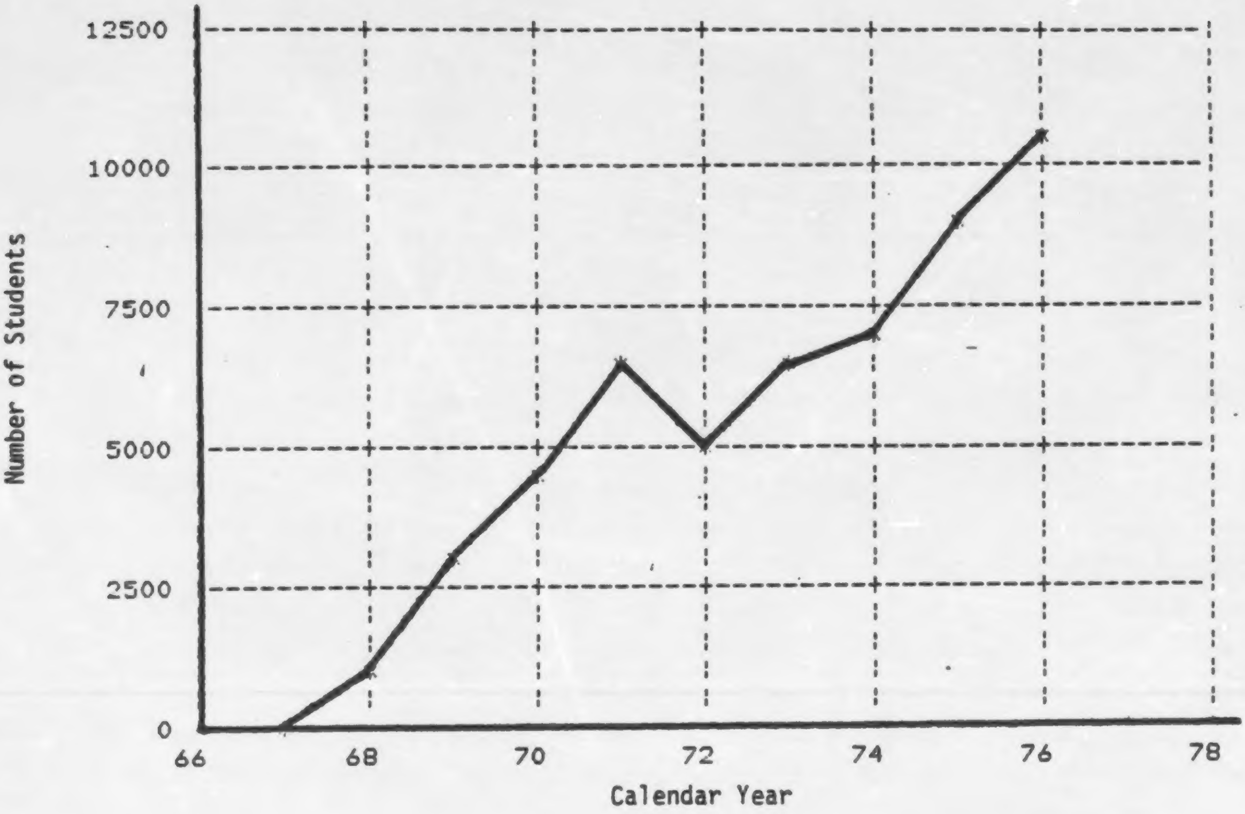
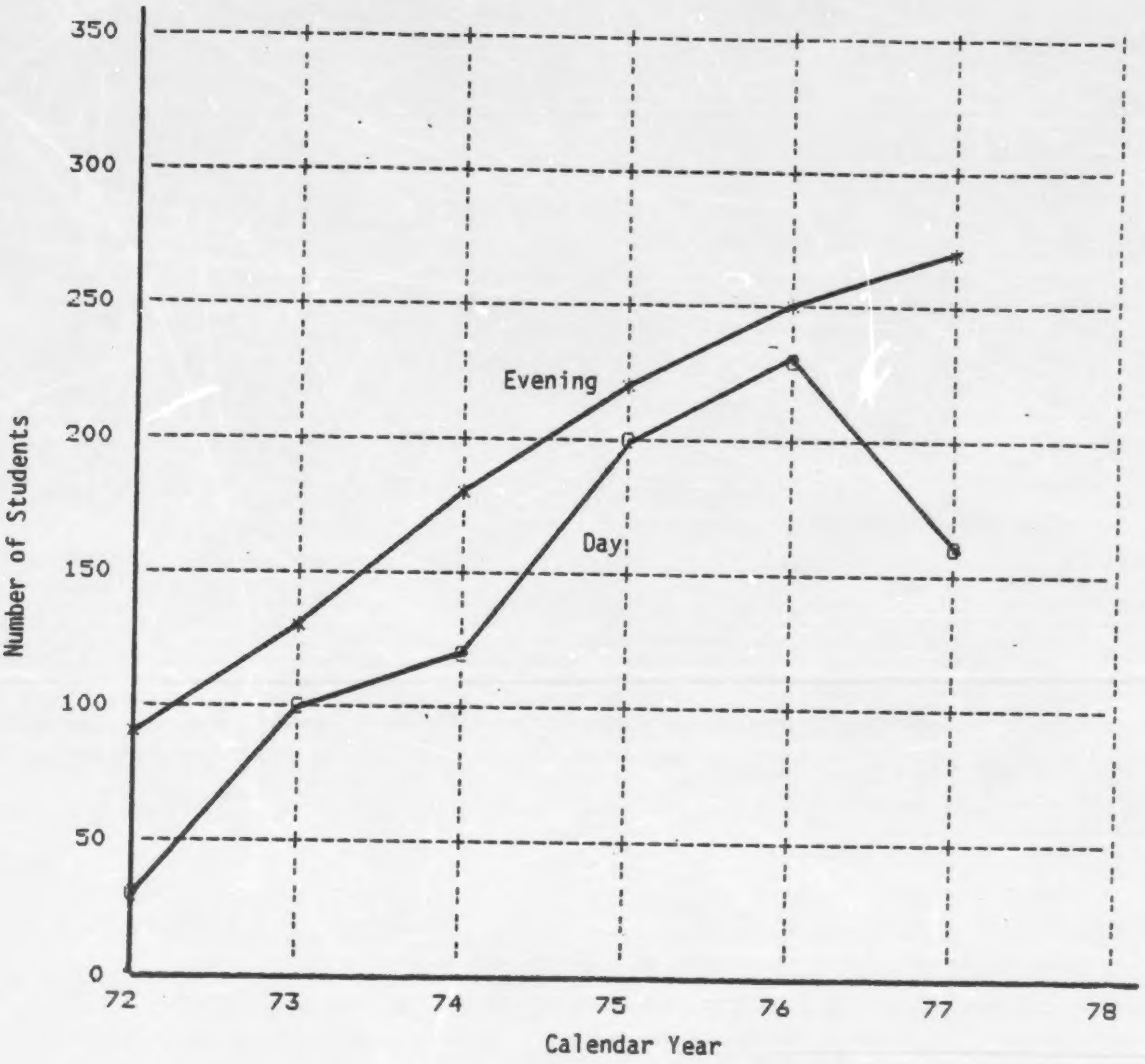


Figure 4.5

N.J.I.T. UPPER DIVISION
FALL B.S.E.T. ENROLLMENTS



the availability of the BSET have caused a recovery in enrollments to 641 in 1977. A student who completes a three-year evening Certificate program must then pursue a 'bridge program', often at a county college, to bring his background up to the level of the Associate degree required for admission to the BSET program. Certificate students are increasingly making use of the bridge program to continue their education. As long as nearby county colleges do not offer equivalent programs, enrollment in the Certificate programs will probably continue in the range of 650-700.

Architecture and Planning

The program of the New Jersey School of Architecture (NJSOA) was established in 1973 with 28 students as a two-year pre-architecture program followed by a three-year professional program leading to the Bachelor in Architecture. Only day courses are presently offered. Successful completion of the first two years does not guarantee admission to the professional program, which is open to qualified students from other colleges and universities. In fact nearly 38 per cent of the third-year class are such transfer students. May of 1977 marked the first graduation from the professional program. Enrollment trends in Architecture are shown in Figure 4.6. With admissions rates of 100 freshman and 75 juniors, the Architecture enrollment would reach a steady state of 400 students when the program is fully phased in by 1979. However, related new programs are planned.

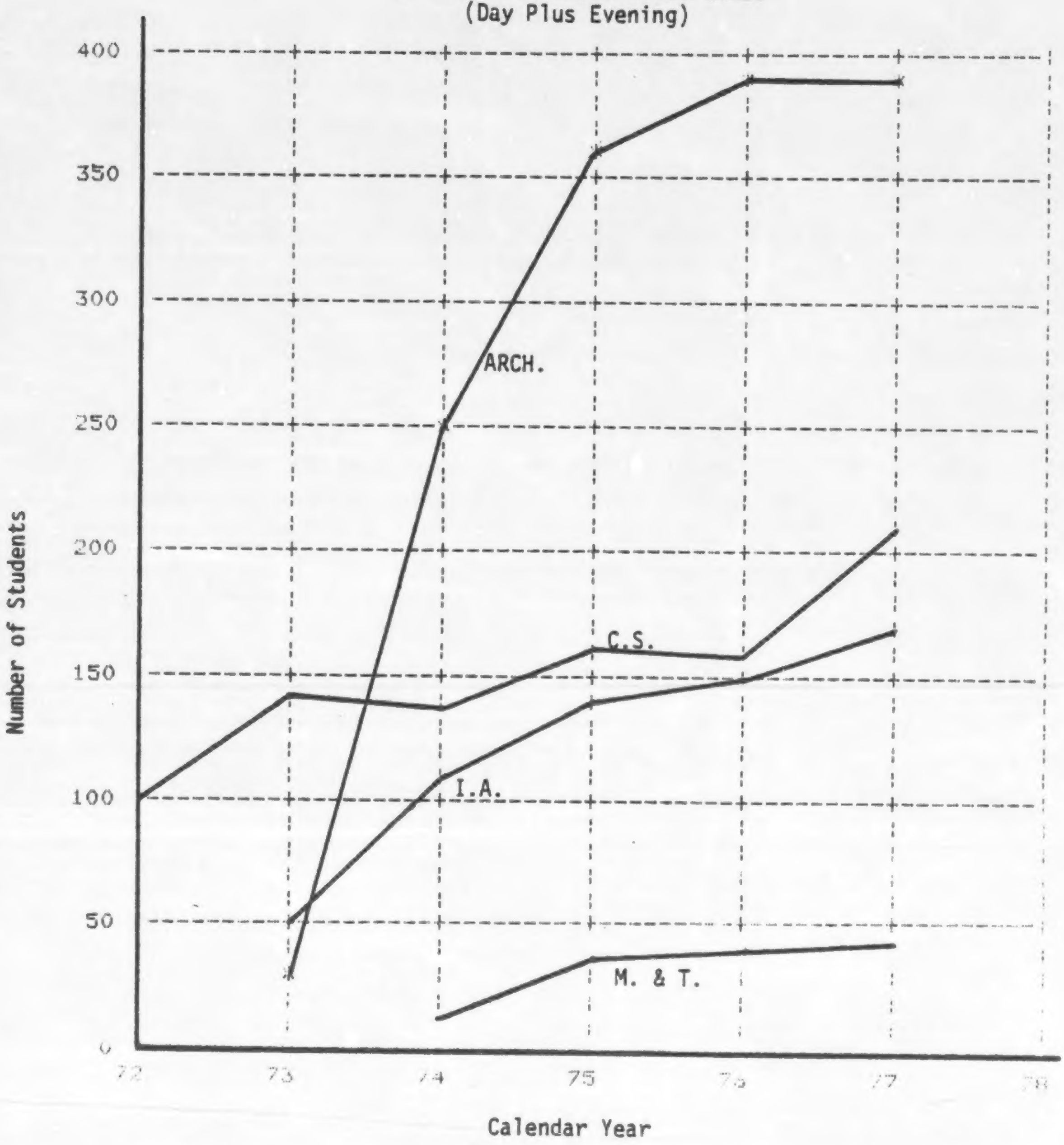
While modest enrollment increases are being predicted for some programs, the future for architecture appears bright. It is the only state-supported undergraduate professional degree program in New Jersey. It is a full-time day program and now that the School has passed its start-up period new avenues in cooperative education and evening programs should be evaluated. This coupled with the increased interface activity with two and four year New Jersey colleges give us added enrollments to draw from.

Because of the large number of applicants we continue to have selective admissions at both the first year level, entry to the pre-professional program in architecture, and at the third year level, entry to the professional program.

Architecture's 2 + 3 program is reaching its planned steady state as far as enrollment is concerned. It now has approximately 200 students in the professional program, the last three years of the 2 + 3. The intention is to limit the third year, entry into the professional program, to 75 students. This is the major planned entry point within the 2 + 3 structure for transfer students. Thus far the pattern shows a 2/3 (NJIT) to 1/3 (transfers) ratio of students entering the third year.

Figure 4.6

UNDERGRADUATE FALL ENROLLMENTS
IN NON-ENGINEERING DISCIPLINES
(Day Plus Evening)



So far we have also limited enrollment in the first year of the pre-professional program. While we continue to have qualified applicants each spring that number around 300 we admit only 85. This number expands to over 100 when EOP and Rutgers-Newark pre-architecture students are added.

The School of Architecture's education development plan calls for design-related professional programs to be added in the near future. Detailed program planning (preliminary program announcements have been processed) has begun for an Industrial Design undergraduate degree program with a projected enrollment of 30 third-year students in the first year of operation; for an Urban Planning & Design undergraduate degree program jointly offered with Rutgers-Newark with a projected enrollment of 30 third-year students in the first year of operation; and a Master of Architecture degree program with a projected enrollment of 15 students in the first year of operation. Future programs will include Interior Architecture, Building Science, Graphic Design and an Urban option in Landscape Architecture at the graduate level.

Projected enrollments for the initial new undergraduate degree programs, coupled with increases in freshmen and sophomore pre-professional programs to feed the new degree options, when fully operational should increase the enrollment from 400 to 700 students.

Industrial Administration

The Bachelor's degree in Industrial Administration was established as a day program in 1973 and as an evening program in 1974, so that it has not yet reached its full potential. Growth has been modest, with the day program enrollment approaching a steady state of 150, and the evening program about 40, as shown in Figure 4.6. If enrollments are bolstered by effective articulation for prospective students at high school and county colleges, the program may reach 225 full-time and 60 part-time students.

Computer Science

Computer Science was initiated as a spin-off from the Engineering Science program in 1972. As shown in Figure 4.6, Computer Science enrollments continue a growth trend. The optimistic projections for computer science employment given in Chapter 3 also suggest continued growth, to perhaps 200-250 full-time students and 75-125 part-time students.

The Computer Science curriculum has the same admissions requirements as the engineering programs; and it is at least as rigorous. It is therefore different from programs with similar titles at certain other institutions. If the distinction between Computer Science and Data Processing can be adequately made, our program should attract a larger number of capable students seriously interested in the field.

'Man and Technology'

The Institute's variation on a liberal education, 'Man and Technology', has shown a modest enrollment growth since its inception in 1974, as shown in Figure 4.6. Recently, freshman enrollments have started to grow as students not admitted to the freshman year in architecture seek alternatives. Whether these students stay with the 'Man and Technology' program remains to be seen. The program also benefits from students who are not admitted to the professional architecture program in their third year.

Enrollments in the 'Man and Technology' program will remain modest, although vigorous new leadership and more adequate publicity is expected to lead to an enrollment of 70-120 full-time and 20-50 part-time students.

Non-Matriculated and Undecided

Our registration process generates a small enrollment of undecided students, primarily freshman, who eventually choose one of the regular academic programs. These students could be distributed proportionally among the degree programs, with, for example, engineering enrollments showing an increase of 25 full-time and 25 part-time. The Nonmatriculated students are largely part-time and are not pursuing a degree. Students from Rutgers, Essex County College, and other institutions appear in this count.

Enrollment Impact of the Newer Programs

To complete our examination of trends in undergraduate enrollments, it is of interest to consider the impact of the newer programs, none of which existed in 1971. Figures 4.7 and 4.8 show that growing enrollments in the newer programs have more than compensated for declining enrollments in the traditional engineering programs, particularly in the evening.

2. GRADUATE ENROLLMENTS

As discussed in Chapter III, graduate enrollments appear to be sensitive to economic factors, as well as demographics. The rate of hiring of engineers by industry directly influences our part-time graduate enrollments.

Figure 4.7

DAY UNDERGRADUATE FALL ENROLLMENTS
(a) ESTABLISHED PROGRAMS (CE,ChE,EE,IE,ME,ESc)
(b) NEWER PROGRAMS (ET,ARCH,CS,BIA,M&T)

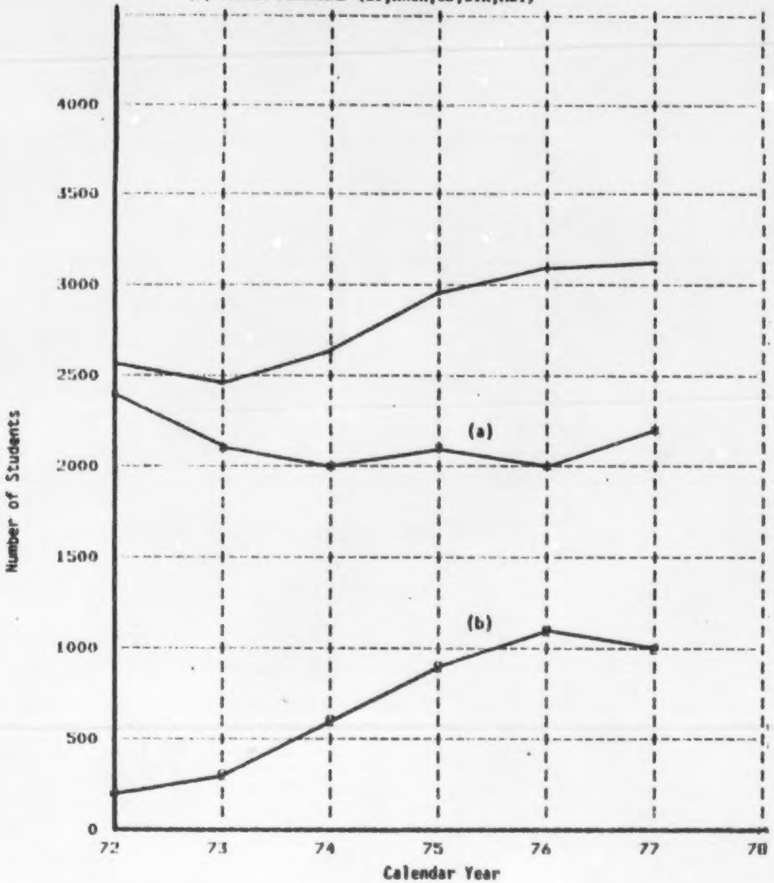


Figure 4.8

EVENING UNDERGRADUATE FALL ENROLLMENTS
(a) ESTABLISHED PROGRAMS (CE,ChE,EE,IE,ME,ESc)
(b) NEWER PROGRAMS (ET,CS,BIA,M&T)

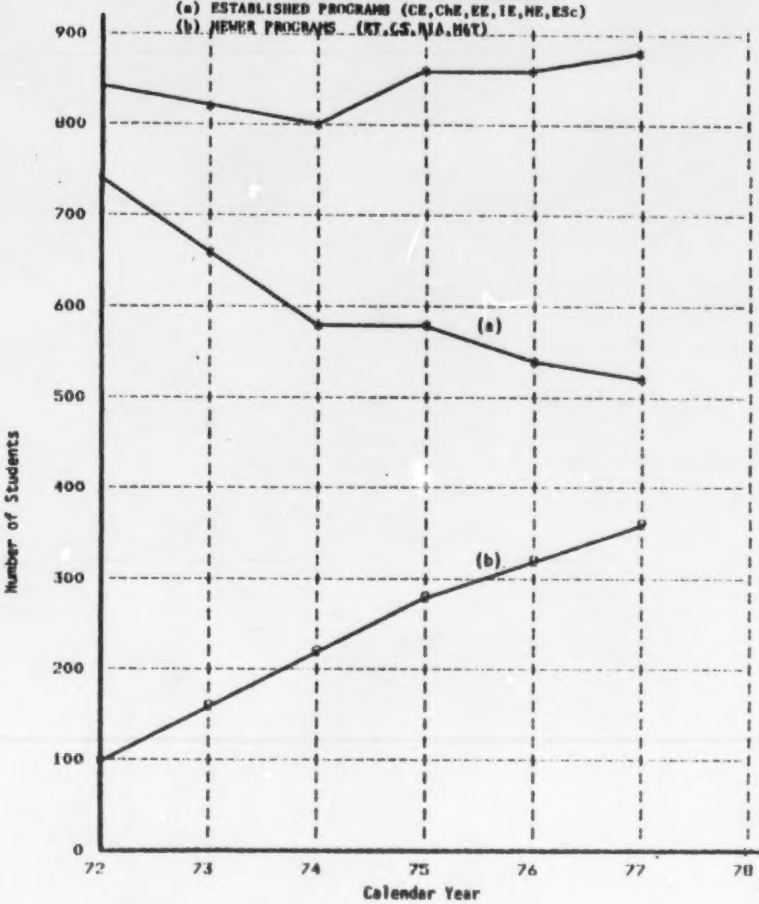


Figure 4.9

M.S. FALL ENROLLMENTS - ENGINEERING PROGRAMS

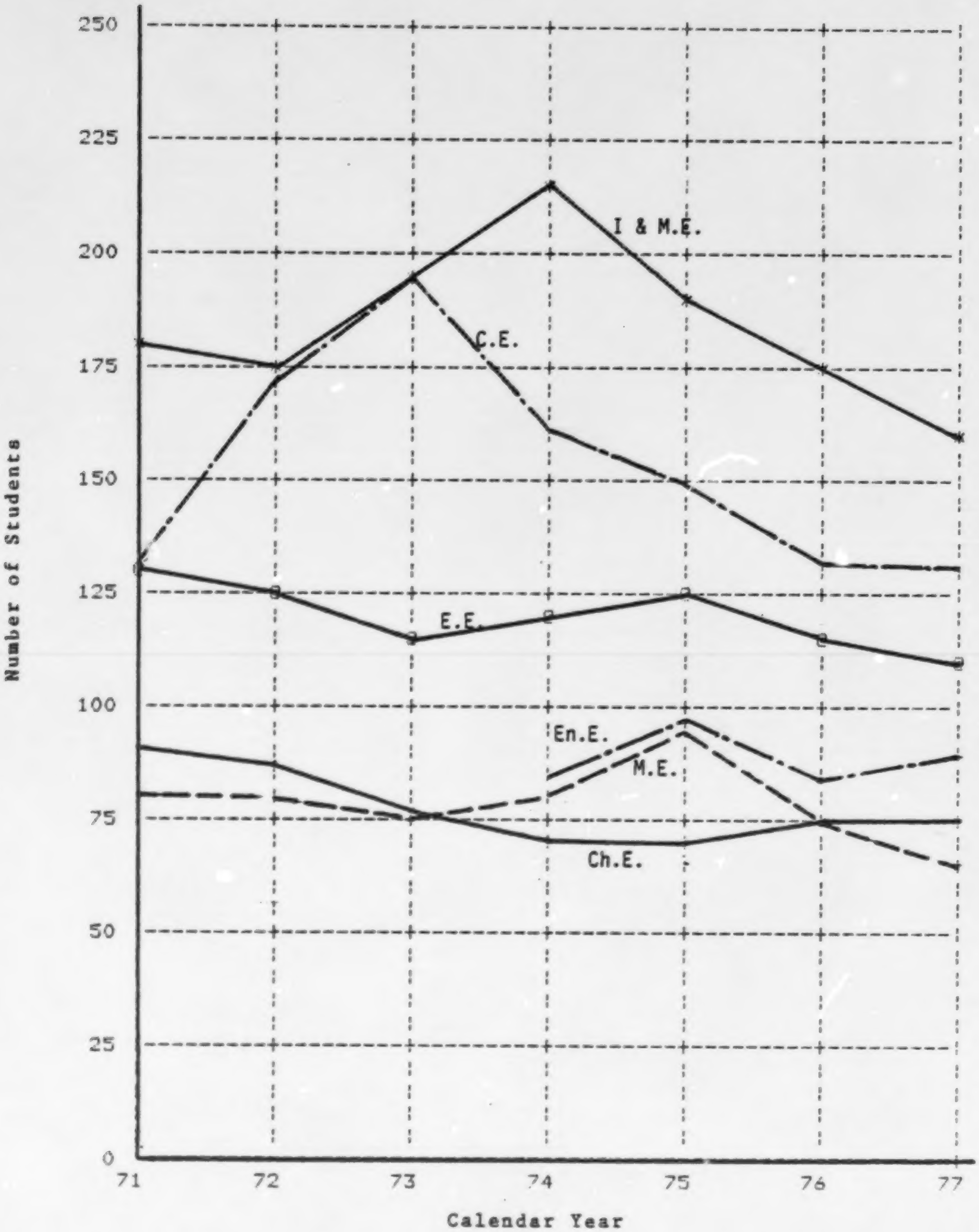
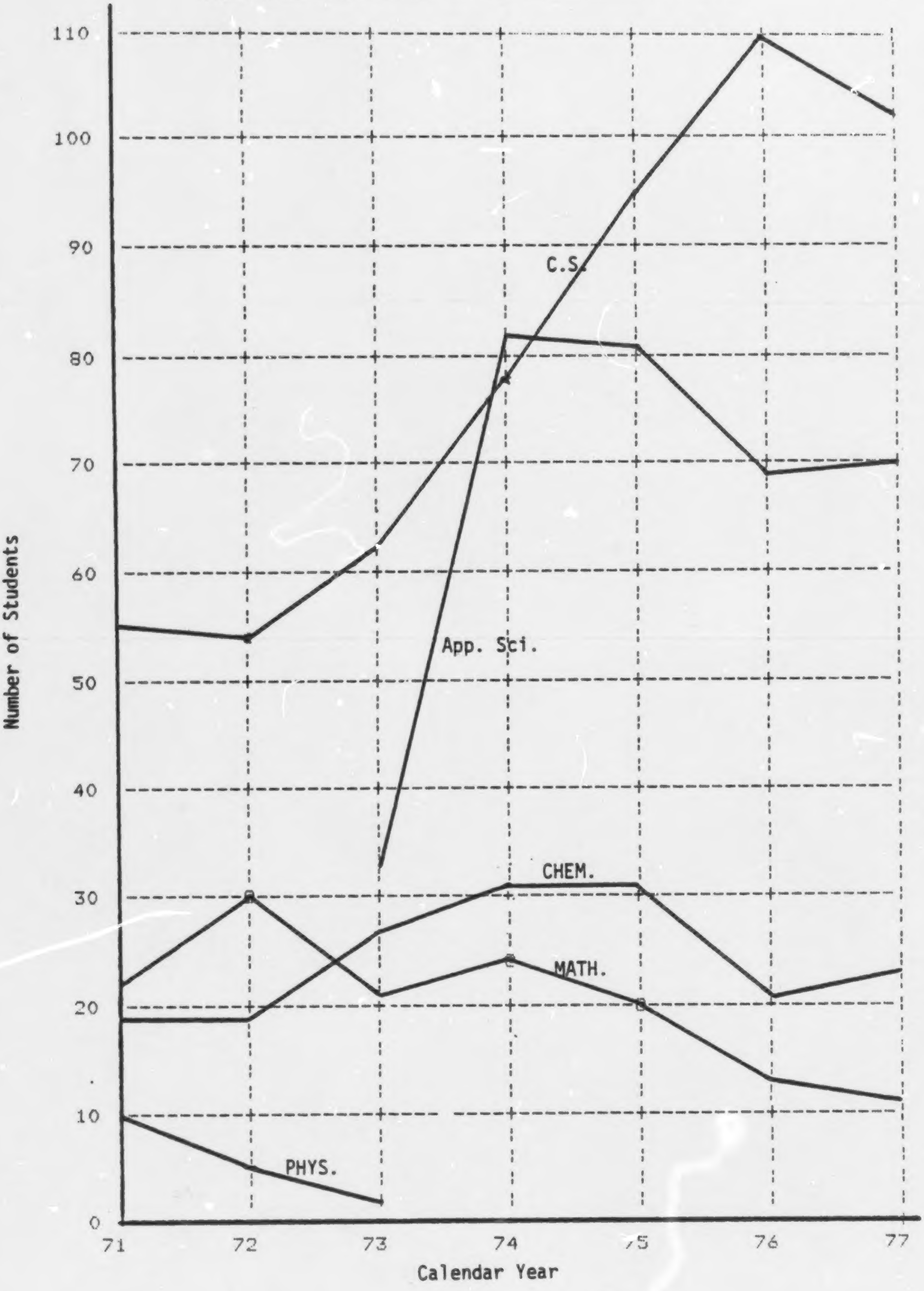


Figure 4.10

M.S. FALL ENROLLMENTS IN NON-ENGINEERING PROGRAMS



Master's Programs.

Enrollment patterns in the MS programs are shown in Figures 4.9 and 4.10. Total MS enrollments (Figure 2.4) showed a peak in 1974/5, with the following decline due to fewer graduates and lower industrial hiring rates. A small increase in new MS enrollments in 1977 suggests the beginning of a recovery as the engineering job market improves dramatically. New graduate programs, such as the impending MS in Architecture, will bolster enrollments. It would seem reasonable to project a steady-state MS enrollment of 900-1000 in the decade ahead.

Enrollments in the individual MS programs show fluctuations similar to those in the undergraduate programs discussed earlier. With the recovery of the economy, engineering MS enrollments should begin to grow. The integrated 5-year MS being developed in engineering departments should also help improve enrollments.

Programs Beyond the MS

The degree of Engineer, a practice-oriented program that requires the equivalent of one year of full-time study beyond the MS, has attracted few students, as shown in Figure 4.11. However, the program requires few additional Institute resources; and it fills a need for study beyond the MS by employed engineers who wish to emphasize engineering practice and design, rather than to pursue the research-oriented doctorate. Enrollment probably will not exceed 10 students in the next decade.

Doctoral enrollments have remained relatively constant over the last six years, fluctuating beteen 50 and 60. In addition to the doctoral enrollment shown in Figure 4.11, a significant fraction of the post-MS enrollment represents those awaiting admission to the doctoral program. There appears to be a slight decline in enrollments since 1974, but the Institute's growing research effort should bolster doctoral enrollments in the decade ahead. A steady-state enrollment of 60-100 can be projected, with a post-MS enrollment of 30-100.

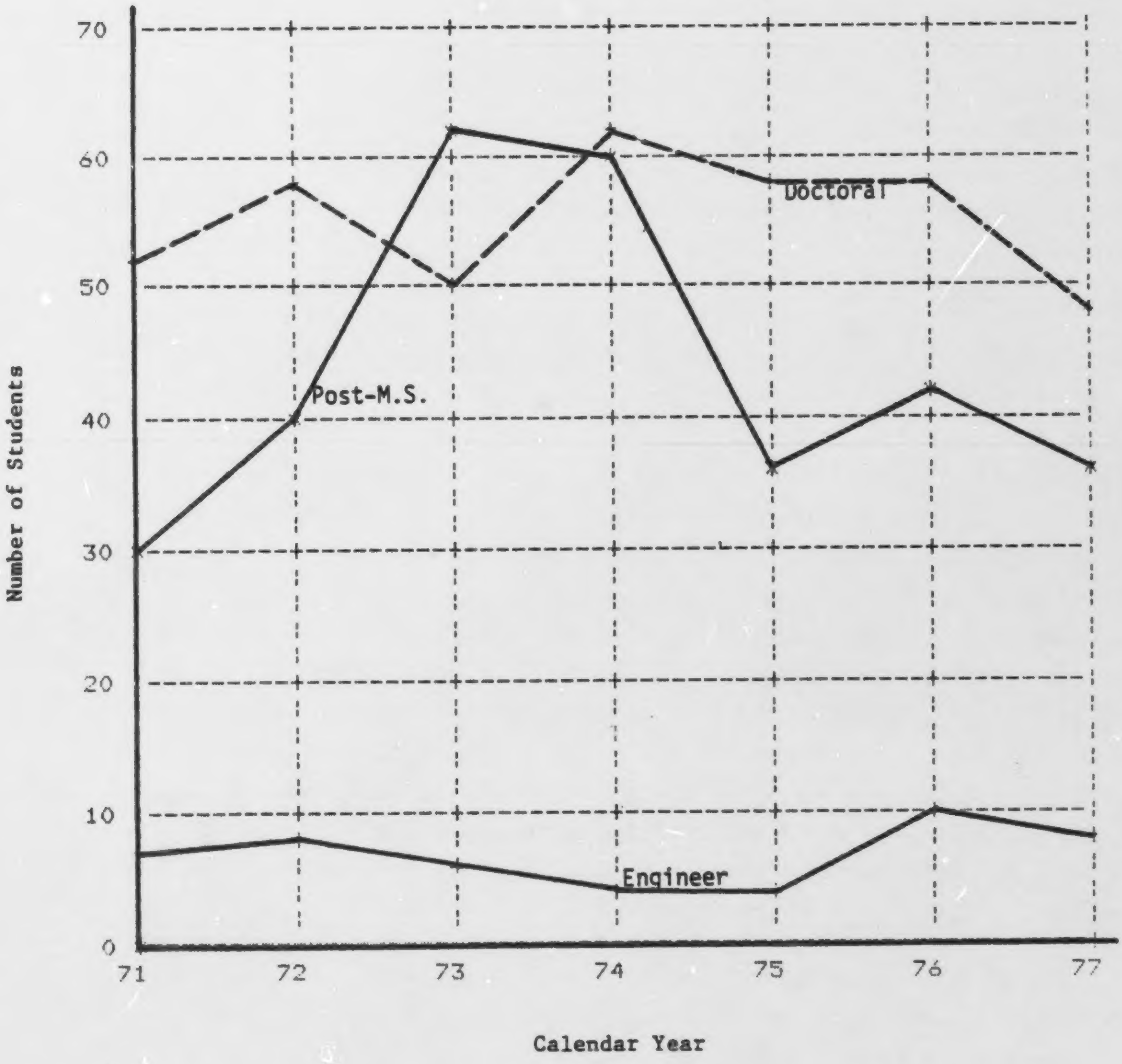
Total Graduate Enrollments

Total enrollments in all graduate programs, Figure 4.12, can be divided into active enrollees and those who are merely maintaining registration (frequently while completing projects, theses, or dissertations).

Most graduate students are pursuing graduate work part-time while employed full-time in industry. In the fall of 1977, only 13 per cent (134) of all graduate

Figure 4.11

GRADUATE FALL ENROLLMENTS
IN
PROGRAMS BEYOND THE M.S.



students were full-time. However, three factors will serve to increase the proportion of full-time students.

1. The MS in Architecture will add 15-25 full-time students.
2. The integrated MS in engineering fields will attract some students full-time who might otherwise have pursued graduate work on a part-time basis.
3. The increasing funded-research effort will provide additional financial aid to attract more full-time students.

While it is difficult to quantify the effects of the last two factors, it is anticipated that in the decade ahead full-time enrollment may range from the present level of about 150 to a maximum of 300, under the most favorable circumstances.

3. ENROLLMENTS IN TERMS OF FTE STUDENTS

The New Jersey Department of Higher Education funding formulas are based on full-time equivalent (FTE) students, rather than the headcount reported up to this point. Data for the fall semester 1977 permit conversion of headcount to FTE, where necessary. Table 4.1 shows the relationship between headcount and FTE for the Institute's various components. In the fall 1977, these factors produced an FTE of 4048 from a total headcount of 5743. These figures exclude summer session.

The trends in FTE enrollment are shown in Figure 4.13, including summer session and DOT Certificate enrollments. Note that the number of FTE students has remained relatively constant since 1968 in programs other than summer session and DOT Certificate.

TABLE 4.1 FALL 1977 ENROLLMENTS
HEADCOUNT COMPARED WITH FTE STUDENTS

DIVISION	ENROLLMENT HEADCOUNT	FTE STUDENTS	FTE/HEADCOUNT
Day Undergrad.	3117	3006	0.96
Evg. Undergrad.	962	401	0.42
Full-Time Grad.	134	89	0.66
Part-Time Grad.**	889	317	0.36
Technology*	641	235	0.37
TOTAL	5743	4048	

*Certificate courses only **Excludes 124 maintaining registration

Figure 4.12

TOTAL GRADUATE DIVISION ENROLLMENTS, 1971-1977

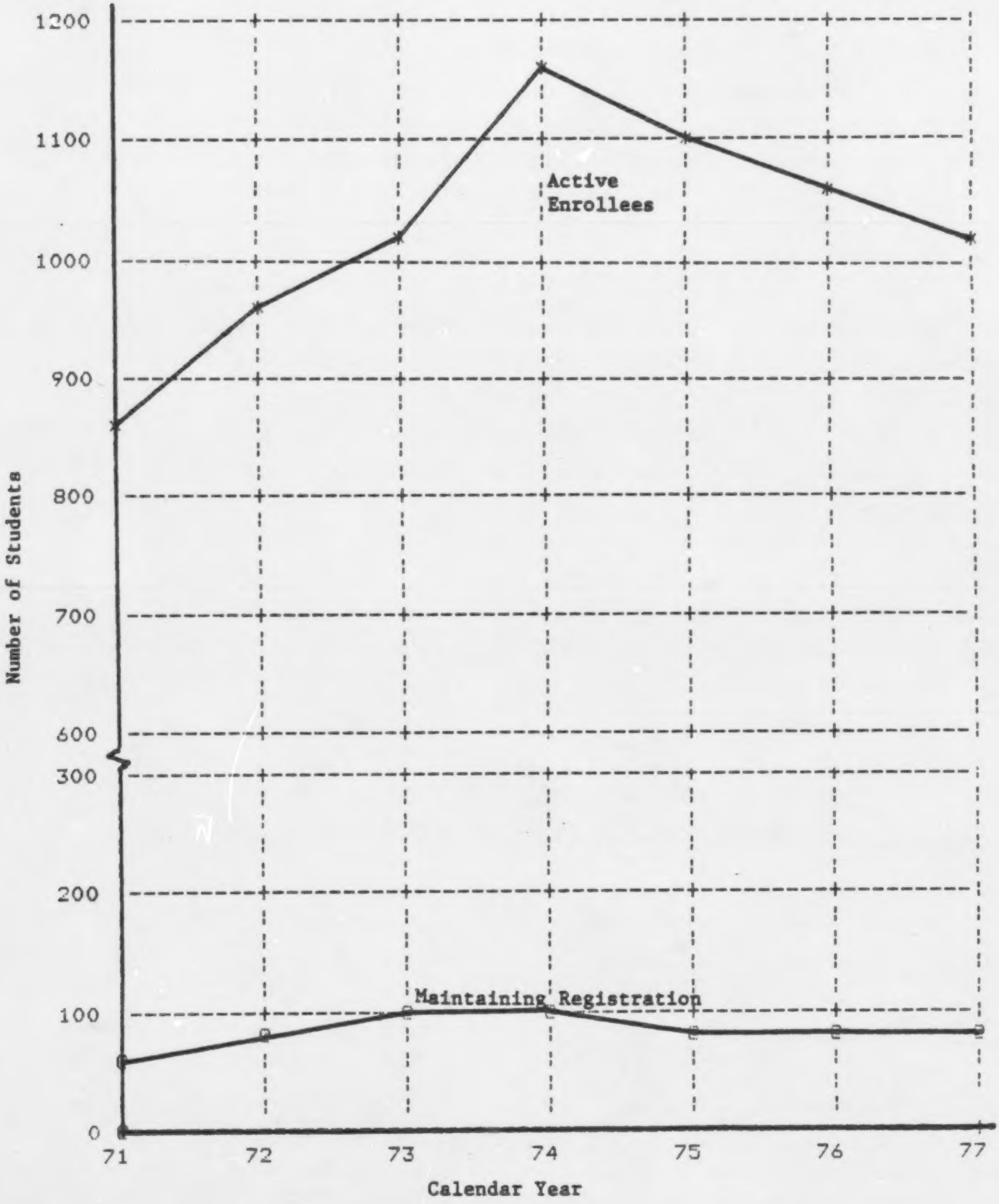
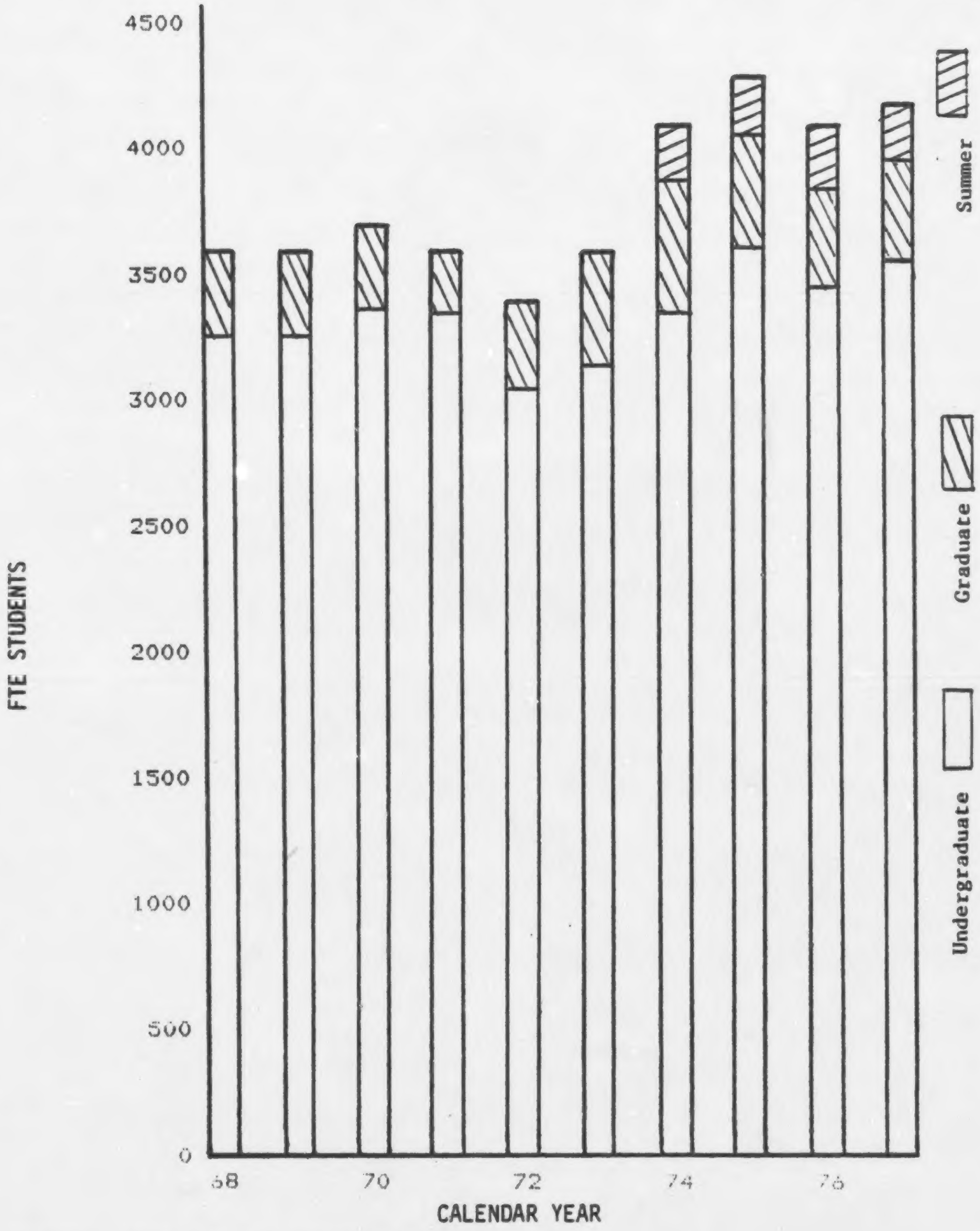


Figure 4.13

TOTAL ANNUAL NUMBER OF FTE STUDENTS



Source: State of New Jersey Budgets 1969-1979.

Notes:

Summer enrollments not included prior to 1974.
Estimated figures used for 1977.

4. PROJECTIONS OF INSTITUTIONAL SIZE

The enrollment projections for the various academic programs discussed in this chapter can be summed to obtain an estimate of institutional size, as shown in the total headcount of Table 4.2. However, it is quite improbable that all favorable factors that have been identified as being potentially influential on enrollments would be acting at once to produce the maximum headcount shown. If they were, the 7605 headcount would generate about 5300 FTE. Instead, a more conservative upper limit of 4800 is shown in Table 4.2, which represents an increase of 12 per cent over fall 1977 FTE.

ADDITIONAL STATISTICAL DATA

To show enrollment trends clearly, this chapter has shown most data in graphical form. To keep the presentation digestible, only a limited quantity of data has been included. Considerable additional enrollment data are available in Section A4 of the Appendix.

TABLE 4.2 INSTITUTIONAL SIZE PROJECTIONS

	Actual Head Count Fall 1977	Projected Enrollment Range for Next Ten Years
A. Undergraduate		
I. Engineering and Engineering Science		
Full-Time	2158	2100 - 2600
Part-Time	528	500 - 600
	2686	
II. Engineering Technology		
Full-Time	164	150 - 275
Part-Time	271	300 - 400
Div. of Technology - Part-Time	641	600 - 700
	1076	
III. Architecture and Planning		
Full-Time	386	400 - 700
IV. Industrial Administration		
Full-Time	134	150 - 225
Part-Time	34	40 - 60
	168	
V. Computer Science		
Full-Time	162	200 - 250
Part-Time	50	75 - 125
	212	
VI. Man and Technology		
Full-Time	40	70 - 120
Part-Time	3	20 - 50
	43	
VII. Non-Matriculated & Undecided		
Full-Time	73	50 - 100
Part-Time	76	50 - 100
	149	
Head Count - Undergraduate	4720	4705 - 6305
B. Graduate		
Full-Time	134	150 - 300
Part-Time	889	850 - 1000
Head Count - Graduate	1023	1000 - 1300
Total Head Count	5743	5705 - 7605
Total FTE	4268*	4250 - 4800*,**

*Includes approximately 220 FTE for summer session.

**Maximum projected FTE is not based on simultaneous maximums of projected head counts.

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CHAPTER V EDUCATIONAL DIRECTIONS

Earlier sections of this document have shown the evolution of the Institute from a strong and still maintained engineering base to a broader, modern technological university which includes programs in applied science, architecture, computer science, engineering technology, industrial administration, and Man and Technology. In this chapter, we shall focus primarily on our undergraduate programs, both academic and those designed to help students to succeed in their academic objectives. We shall examine our current offerings, and project plans for new fields and new program offerings in the future. In addition, we will examine our educational objectives, and, finally, discuss plans for periodic review of our academic programs to ensure their continued excellence.

1. UNITARY INSTITUTION

NJIT has always believed, and continues to do so, that the best professional training is one supported by a broader and more liberal education. Yet we recognize that our students have special needs and talents. Thus, both technical and non-technical courses at NJIT are taught by faculty particularly sensitive to our students.

Faculty in mathematics and science represent both the mathematical/scientific disciplines and engineering/applied sciences. Humanities and Organizational sciences faculty, while maintaining their discrete disciplines (e.g., economics, psychology, literature, history, philosophy, etc.), also offer courses specifically designed for technological students (e.g., The City in History, The Philosophy of Science, Science Fiction, etc.).

Furthermore, faculty in the non-technical disciplines are fully integrated into the academic and governance structure of the Institute. This affords them greater knowledge of the students they teach and continuous interaction as well with all segments of the academic community. They work cooperatively on such projects as CAUSE[*], and are represented jointly on the Faculty Council, the Academic Affairs Committee, the Executive Committee, and all of the standing committees of the Institute. In recent years, the integration particularly of the Humanities and OSS departments has been most pronounced in the areas of inter-disciplinary programs and curriculum development.

Academic departments offering programs in these areas will be encouraged to expand and initiate programs in technologically based liberal arts areas such as Man and Technology, as well as Industrial Administration and Engineering Science, at undergraduate and graduate levels. Because of the success of our integrated technical and non-technical offerings, the Institute will continue its tradition of maintaining a unitary institution at the same time that it works to maximize its cooperative efforts with neighboring schools.

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[*] See Section 3 of this chapter.

2. COOPERATION WITH OTHER INSTITUTIONS

In addition to the many programs available to him on his own campus, the NJIT student profits from the cooperative relationships NJIT has established with various neighboring institutions.

Although now defunct, the Council for Higher Education in Newark (CHEN) made possible a significant assortment of academic linkages, which still survive, between NJIT and Rutgers-Newark. These include the following:

-Joint doctoral program in management
-Master's program in public administration
-A geology course at Rutgers for NJIT civil engineering students
-Various electives at Rutgers for NJIT prearchitecture students

The mutual benefit derived from these successful beginnings is likely to encourage cooperation in the future, especially since the academic calendars for NJIT and Rutgers-Newark will be almost identical as of the Fall of 1978, and since, moreover, cross-registration between the two has been simplified. Currently, in fact, we are jointly exploring the possibility of a faculty development program, and we expect a more formal joint planning structure than now exists to emerge in the future. Although the Chancellor's "call" of early 1978 for the development of a master plan for higher education in New Jersey, a call which sets a time-table for the development of such joint planning, applies to NJIT's relationship to all other institutions in New Jersey, our relationship to Rutgers-Newark is a special one by virtue of geographic proximity and the history of past associations.

Despite some gratifying exceptions, NJIT and Essex County College have not developed the range of complementary relationships that their missions and proximity would suggest. Various discussions, however, between the schools, and the success of the arrangements which have made possible the transfer of Essex County College students to NJIT's Industrial Administration program, promise greater cooperation in the future. Major areas for exploration and joint program development include the following:

- Development of a joint pre-technology/technology program which would enable Essex County students to have access to the fields at the AAS level.
- Development of a cooperative program that would make the strengths of both institutions available to EOP students.

Both NJIT and the College of Medicine and Dentistry of New Jersey have studied the possibility of cooperative programs in the research/graduate area. Although the development of such possibilities has moved slowly in the past, it seems to have quickened in the past few years. A major joint interest in the problems of the physically handicapped is emerging which should yield significant results. In addition, joint programs may be expected in the allied health fields and specifically in the area of industrial hygiene. The present informal structure of administrative and faculty contact between the two institutions seems to be adequate for the foreseeable future.

Cooperation with other New Jersey institutions will also be studied with respect to:

- programs for minority/disadvantaged students
- research cooperation with health-related institutions, industry, and governmental agencies.

3. SPECIAL PROGRAMS AND PROGRAMS FOR EMERGING STUDENT NEEDS

Cooperation with neighboring institutions meets many of the special needs of NJIT students. Many others, however, are met at NJIT itself by specific programs which address themselves to the special requirements of individual students, whether these are academic, professional, or personal.

The gifted student has Honors sections available to him in the core program. Many of the departments provide Honors sections or make special project courses available to the gifted student. The engineering departments provide senior projects directly involved with faculty research for the student expressing an interest in graduate studies. A high academic standing and the recommendations of the faculty identify most students capable of such work. In addition, the CAUSE program helps to identify those students potentially capable of Honors work.

As part of its commitment to academic quality, the Institute is engaged in a large experiment with its pre-engineering program. Supported in part by a three-year grant from the National Science Foundation's Comprehensive Assistance to Undergraduate Science Education (CAUSE) Program, this experiment has the following objectives:

1) to improve the students' fundamental skills and knowledge.
2) to provide for a minimum level of achievement in science, mathematics, problem-solving and verbal skills.
3) to improve the students' attitudes toward academic and professional pursuits.
4) to introduce the students to several engineering disciplines and involve them in actual engineering design, so that
    a) they can choose the discipline which best fits their needs and aspirations
    b) they can relate their pre-engineering course work to the practice of engineering.
5) to develop and apply a design for program evaluation which will serve as a model and enhance the Institute's capability for self-assessment, management, and evaluation of its educational programs.

Because of large differences in entering student abilities in verbal skills, mathematics, and the sciences, a multi-track curriculum system has been devised. Entering students are given placement tests before the fall registration. Using a model which incorporates these results with SAT scores and high school class rank, the students are placed in the appropriate initial courses and course sequence. The obvious advantage of this plan is that it builds a better basic foundation for the students' subsequent studies.

To provide entering students with needed counseling, a faculty advising service is now in use. The unique characteristics of this service are adequate supervision, written reports, and close liaison between the counselors and the students' instructors. Experience to date shows this system to be highly effective in boosting student morale and ultimately in retaining students in the program.

A coordinated system is being developed, moreover, which includes tutoring services and audio-visual aids located in learning centers. This system can be extended to include laboratory work assigned on an individual basis.

The overall effectiveness of this program will be measured in a competency exam in the pre-engineering fundamentals that will be given at the end of the sophomore year. We plan to use the Engineering Fundamentals Test of Educational Testing Services, to which will be added questions in English composition, computer science, and graphics. The results of this examination will be used mainly for identifying learning deficiencies and ultimately as a possible screening device for entrance into professional programs. The outcome of the CAUSE experiment, if successful, should be improved remediation and advising, and enhanced retention of undergraduate students.

For ten years, NJIT has sustained an Educational Opportunity Program (EOP) which has demonstrated that it can help minority and disadvantaged students to complete successfully a degree program, overcoming formidable academic, economic, and personal obstacles.

A recent report of the Engineering Manpower Commission places NJIT 20th in terms of minority enrollment in engineering among U.S. institutions, and second in terms of B.S. graduates in engineering. This apparent disparity reflects the Institute's success in retaining minority students to graduation. It should be emphasized that not all minority students enter the institution through the Educational Opportunity Program. The two largest minority groups are Black and Hispanic, as indicated in Table 5.1.

EOP students are succeeding despite their initial inability to meet the traditional criteria for admission to the Institute. Supported by tutors, special academic programs, financial aid, and personal, academic, and career counseling, the Program has an overall retention rate comparable to that of the Institute's student population.

In addition, the overall grade-point average for program students is comparable to that of the general student population.

TABLE 5.2 ENROLLMENT IN EDUCATIONAL OPPORTUNITY PROGRAM, FALL 1977

FRESHMEN	73
´OPHOMORES	65
JUNIORS	47
SENIORS	42
TOTAL	227

MALES	FEMALES
169	58

TABLE 5.1

STUDENTS ENROLLED, BY RACIAL/ETHNIC BACKGROUND, IN FALL 1977

Racial/Ethnic Categories	PRE-BACCALAUREATE STUDENTS				POST-BACCALAUREATE STUDENTS			
	Undergraduates (Enrolled for a Formal Award)		Non-Degree or Diploma/ Non-Certificate Students		Graduate Students (Candidates for a Formal Award)		Non-Degree or Diploma/ Non-Certificate Students	
	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time
MALE								
Non-Resident Alien	79	0	0	0	35	4	1	0
Black, Non-Hispanic	105	15	0	7	0	1	0	5
American Indian/Alaskan Native	5	0	0	0	0	0	0	0
Asian/Pacific Islander	46	7	1	1	3	3	0	4
Hispanic	120	12	0	2	0	0	0	1
White, Non-Hispanic	2264	1548	107	70	76	659	2	181
Race Unknown	0	0	0	0	0	0	0	0
TOTAL: ALL MEN	2619	1582	108	80	114	667	3	191
FEMALE								
Non-Resident Alien	3	0	0	0	3	1	0	0
Black, Non-Hispanic	40	4	1	3	0	1	0	3
American Indian/Alaskan Native	0	0	0	0	0	0	0	0
Asian/Pacific Islander	4	0	0	0	0	0	0	1
Hispanic	12	1	0	2	0	1	0	0
White, Non-Hispanic	150	62	6	15	17	46	0	24
Race Unknown	0	0	0	0	0	0	0	0
TOTAL: ALL WOMEN	209	67	7	20	20	49	0	28
GRAND TOTAL:	2888	1649	115	100	134	716	3	219

A program that is making it possible for the student to be exposed to the engineering world is the Cooperative Education program recently reintroduced at NJIT. Cooperative Education is a voluntary five-year program, available to those who have completed the first and second year at NJIT with a GPA of 2.2 or better. The program provides the student with two six-month work periods during the junior academic year, as indicated in the typical cooperative program schedule of Table 5.3.

The purpose of the Cooperative Education Program is to integrate classroom theory with practical experience. The following points should be emmphasized:

1. The student's work is related as closely as possible to his field of study and individual interest within the field.

2. The employment is considered to be a regular, continuing and essential element in the educational process, and some minimum standard of performance is expected to be included in the requirement for satisfactory completion of this phase of the student's work.

3. The work increases in difficulty and responsibility as the student progresses through the academic curriculum, and in general parallels as closely as possible his progress through the academic phases.

Cooperative Education was initiated as a pilot program in the Mechanical Engineering Department in July, 1976, and approved by the faculty in May, 1977.

The Mechanical Engineering program started with the placement of one group of 13 students with 12 employers. Presently, there are two groups of 13 Mechanical Engineering students each, and one group of four Industrial Engineering students. This coming summer will see initial groups of Co-op students from all Engineering fields, and soon we expect to have Co-op students in Computer and Information Science and Industrial Administration. Figures 5.1 and 5.2 illustrate the planned growth of the program.

We anticipate that, with tuition income and grants to offset administrative and other costs, the Cooperative Education Program will become self-sustaining.

The academic programs at NJIT meet the technical needs of the U.S. Air Force, and NJIT continues to include, as it has for some time, an Air Force ROTC program. Present enrollment in the program is approximately 100 students, of whom about 30% is made up of NJIT students. The other 70% comes from nine schools with either crosstown arrangements (William Paterson, Montclair State, Kean, Seton Hall, Stevens Institute, St. Peter's,, and Jersey City State), or consortium arrangments (NCAS-Rutgers and Essex Community College).

TABLE 5.3 TYPICAL CO-OP SCHEDULE

	Group I	Group II
First Year	All Co-op students are enrolled in the regular freshman year.	
Second Year	All Co-op students are enrolled in the regular sophomore year.	
Third Year	Work Period I (July-December)	Junior Coursework (Fall Semester)
	Junior Coursework (Spring Semester)	Work Period I (January-June)
Fourth Year	Work Period II (July-December)	Junior Coursework (Fall Semester)
Fifth Year	All Co-op students are enrolled in the regular senior year	

(A student may choose Group I or Group II)

Figure 5.1

STUDENTS ON CO-OP WORK EXPERIENCES
JULY 1976 THROUGH JULY 1981

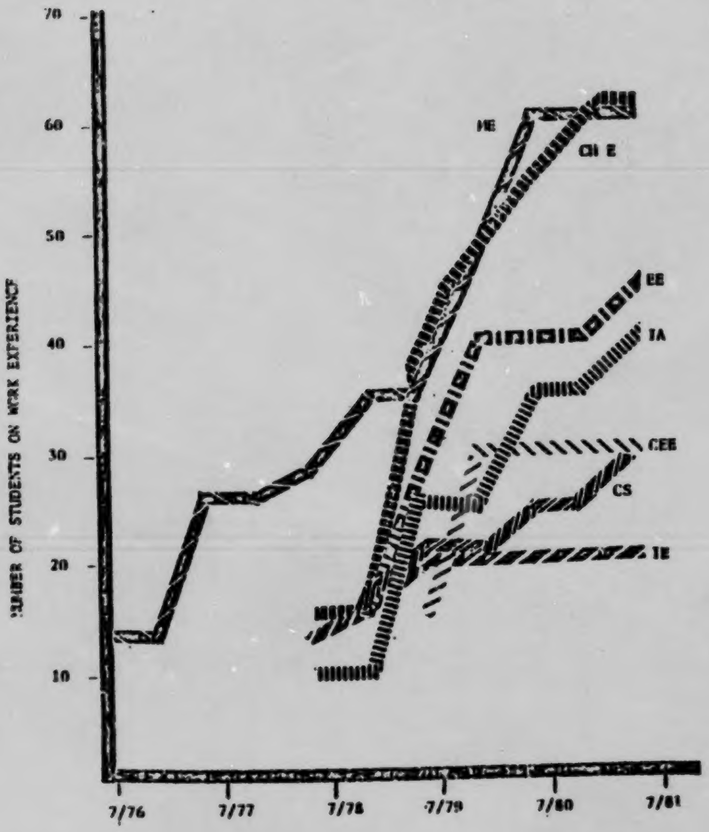
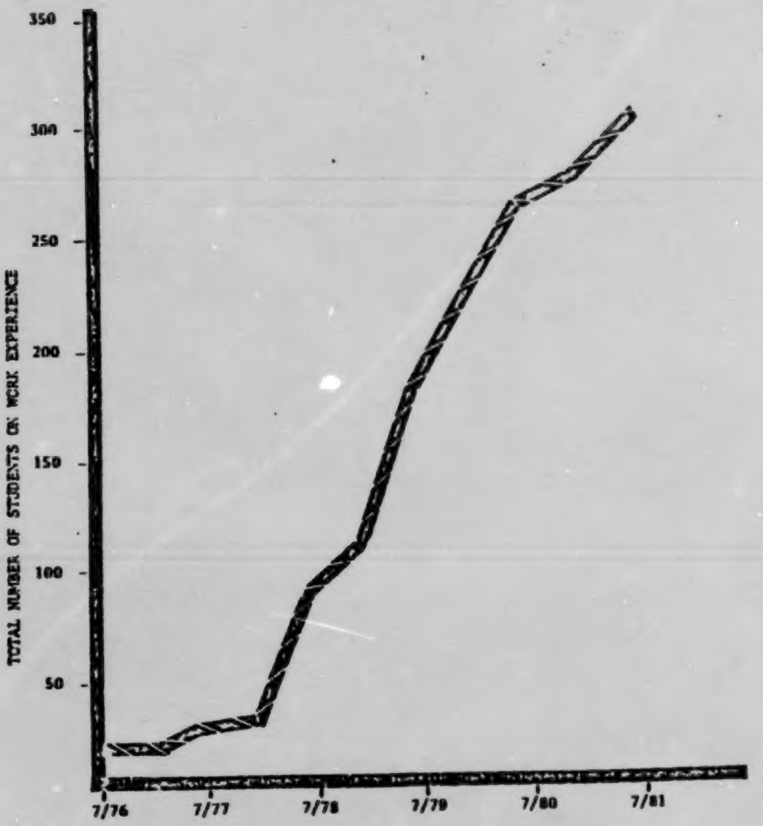


Figure 5.2

TOTAL NUMBER OF STUDENTS ON CO-OP WORK EXPERIENCE
JULY 1976 - JULY 1981



The primary emphasis in AFROTC is on quality. All applicants must meet a minimum standard with regard to cumulative grade average and Scholastic Aptitude Test scores, and must as well demonstrate potential for leadership.

The Air Force has increased the number of scholarships which pay tuition, books, fees, and a subsistence allowance of $100 per month. There are presently 30 students in this program at NJIT on scholarships, 14 of which are NJIT students.

4. CURRICULAR OBJECTIVES

NJIT has long held an excellent reputation for BS graduates who are practical engineers ready for entry as professional personnel in industry.

Since World War II, there has been a dramatic increase in graduate studies in engineering and architecture, with some contention that this development is inevitably leading to the acceptance of the Master's as the first professional employment degree. Yet most corporations and professional societies have indicated that they still favor the BS as the entry degree for the profession. Hence, while recognizing this trend, NJIT must continue addressing itself to the educational needs of the student who seeks professional employment upon attaining the BS degree. Accordingly, we state the following planning principle: the BS degree will continue to be awarded as the first professional degree in all of the Institute's programs.

Engineering and technological curricula have been and will continue to be, in fact, excellent preparation for other careers as well. For the student who changes his educational goals as he matures, as well as for the student who deliberately begins his studies in engineering and/or technology with a different career in mind, technical programs have been the entry to many professional fields. Past engineering graduates have, for example, gone on to careers in law, medicine, and many other areas, finding their engineering training extremely valuable.

Although the majority of students will find the BS degree sufficient for entry into their professions, some students, especially those interested in research and design, will want to pursue advanced study. In fact, to encourage involvement of undergraduate students in research, as well as in full-time graduate study, the Institute is planning to establish a five-year program leading to a combination of BS and the MS degrees. This program was initiated in the Spring of 1977 by the Chemical Engineering Department, and other departments plan soon to develop curricular programs that will integrate the BS and MS degrees for capable students wishing to undertake five years of full-time study. We will also continue to offer part-time MS programs for the working engineer with a BS degree.

The Graduate Division is characterized by a curriculum which is practical rather than purely scientific, and which responds to the needs of industry and government. Curricular objectives stress problem identification and synthesis, calling upon fundamental scientific and mathematical studies as tools in the creation of new techniques to problem solving. NJIT is the only major New Jersey institution offering practitioners in the industrial community the opportunity to pursue part-time evening degree programs for the BS, the MS, and the professional Degree of Engineer. Graduates with the MS degree are equally prepared for technological careers or further study at the doctoral level, at NJIT or elsewhere.

NJIT will continue to provide for the part-time and full-time postbaccalaureate student programs permitting him to sharpen his technical skills and, at the doctoral level, preparing him for a career in applied research.

Plans for development of the graduate and research mission are discussed in a later chapter.

NJIT also offers a Certificate program through its Division of Technology. The certificate program plays a unique and necessary role in the Institute. While the Institute offers the best technically oriented degree programs and fulfills a need statewide, the certificate programs, which offer the best training for engineering technicians, draw their students mostly from the Newark area and nearby counties. This program, therefore, serves mainly the local need for students whose career objectives, abilities, and aptitudes lean toward the engineering technology profession. The need for engineering technicians is enormous, and will continue to be so for years to come. This program can fulfill this need for a very special group of students who could not progress in their employment and better their positions without this advanced training.

Because of the need for engineering technicians, the State has indicated a desire for more certificate programs. Therefore, consideration will be given to offering certificate programs during the day as well as in the evening. This will serve a need in our geographical area for a special group of young people who would not otherwise have this opportunity for post high school technical training.

5. SCOPE OF ACADEMIC PROGRAMS

Current programs at NJIT include the following:

- Engineering
- Technology
- Management and industrial administration
- Architecture
- Computer and information science
- Cross-disciplinary areas which include the above and which involve the relationship between technology and society.

Among new areas NJIT is considering and/or planning for the future, near and distant, are the following:

Short Term

- Surveying
- Plastics Engineering
- Industrial Design
- Applied Chemistry, Mathematics and Physics
- Industrial Health and Safety
- Industrial and Labor Relations
- Urban Planning
- Resource Management and Manpower Planning

Long Term

- Biomedical Engineering
- Materials Science
- Technology Options in
  - Plant Engineering
  - Industrial Hygiene
  - Plastics
  - Transportation
  - Structures
  - Electronics
  - Communications
  - Power
- Productivity Studies
- Nuclear Science and Engineering
- Computer Engineering
- Energy Systems

6. QUALITY OF ACADEMIC PROGRAMS

The general quality of the Institute's undergraduate programs has been judged satisfactory by the Commission on Higher Education of the Middle States Association, the Engineering Education and Accreditation Committee of the Engineers' Council for Professional Development, and the National Architectural Accreditation Board.

To continue and to improve our current standing, however, we must be able to update and to extend our laboratory facilities. Laboratory instruction is, of course, a major component in the quality of professional education in technical fields, and by their very nature laboratory facilities are more expensive than any facilities required by disciplines in the liberal arts.

In the past, NJIT took a very conservative approach to laboratory expenditures. As a result, with few exceptions, the laboratories are not up to date, and are indeed lagging behind most major schools of engineering. Significant expenditures for laboratories have mainly occurred when new buildings were being built or renovated. Examples of this are Faculty Memorial Hall in 1966, housing Electrical Engineering, Tiernan Hall in 1972, housing Chemical Engineering and Chemistry, and the newly acquired building at 200 Central Avenue for Mechanical Engineering.

The Institute plans to carry forward a major modernization program for its instructional laboratories, a program that will allow new methods of instruction to be used, especially in upper-division design laboratories.

To update, all the Institute programs will require:

1. Modern equipment and facilities for both undergraduate and graduate laboratory courses, project and thesis work.
2. Specialized equipment and space for meeting the research obligations of the Institute involving both students and faculty.

A five-year assessment of funds necessary to update laboratories was made by the academic departments. The total cost of needed new undergraduate laboratory equipment at current prices is 1.5 to 1.75 million dollars. For graduate/research laboratories, the equipment required will cost approximately $750,000.

Acquisition of this equipment is considered the first priority in academic needs for additional resources during the next five years. Various funding sources can be used, including "above-formula" state funding, NSF laboratory equipment grants, NJIT and other Foundation research grants, and donations of equipment or money for equipment from local industries and research laboratories.

For planning purposes, projected requirements will average $500,000 per year for five years, with approximately 45% of the required five-year total projected for the first two years. Purchases will be scheduled to synchronize with related development of staff, space facilities, research productivity, and programs.

7. PERIODIC REVIEW OF ACADEMIC PROGRAMS

A key element in maintaining excellence in the academic programs at the Institute is periodic review.

Internal review is a standard practice of academic departments at NJIT as at almost all colleges. The faculty studies, examines, and changes the curriculum to provide the best and most current programs possible.

Almost all of the programs at NJIT lead to professional degrees. As such, they are subject to the scrutiny of the respective professions. This involves an in-depth evaluation every six years for engineering and every five years for architecture programs, leading to accreditation when warranted. Loss of accreditation would be a severe setback to a professional school and so every effort is made to satisfy the professions' strict requirements.

The formal accreditation process, directed at a national level, is supplemented by an informal interaction between State societies and the Institute, the object being to maintain the best programs possible. Since the hallmark of a profession is the education of its members, this interaction is both vigorous and useful.

The final element in the review process consists of external review by teams of recognized experts who conduct a more intense investigation even than the professional accreditation. This is especially important in assessing the support programs at the Institute, areas in which the accreditation reviews are not carried to sufficient depths.

This external audit can also focus on such sensitive questions as:

1) need for the program
2) cost effectiveness as compared to other universities nationwide
3) interaction and relations of the program under review to other programs in the State
4) whether the program satisfies local and national markets
5) whether programs match the Institute's stated objectives
6) whether the program is appropriate to the student body.

The review process requires criteria for evaluation. These criteria come about from discussions between the Institute, the D.H.E., and the professions involved.

CHAPTER VI THE RESEARCH MISSION AND GRADUATE PROGRAMS

During the past twenty-five years the Institute has developed a strong graduate and research program. In addition to the full-time research programs, at both Master's and Doctoral levels, the Institute offers part-time evening Master's and Degree of Engineer programs which meet the needs of employed students and their employers. The graduate and research programs help to retain and attract excellent faculty, to stimulate vital teaching, and to draw a large number of capable students.

Appointment of young research-oriented faculty and the reduction of faculty teaching loads during the past decade have resulted in measurable improvement in the Institute's graduate/research efforts. Some demonstrable effects may be noted:

1. There has been a nine-fold increase in the externally funded research from the 1966-67 academic year to the 1976-77 academic year (see Figure 2.6).
2. The annual rate of growth of funded research in the last three years (1974-77) at about 40% per year is much larger than the corresponding figure for National R & D expenditures growth. As shown in Tables 12.6 and A6.1 of the Appendix, this rate of growth should soon bring NJIT to parity with similar institutions.
3. The number of faculty publications has grown by a factor of more than five from 1966 to 1976.

During this period of growth, although some faculty and students have pursued purely theoretical topics, the main thrust of the Institute's research effort has been in applications of technology, especially that technology pertaining to the analysis and solution of modern societal problems. Recently, NJIT has been requested by the National Environmental Protection Agency to act as a central State resource in the environmental area.

In the development of this section of the Institute's long range plan, we shall consider some of the new graduate and research programs that we feel will be necessary to keep the Institute responsive to developing trends in technology and society. Some of these programs will be within individual disciplines, others will be interdisciplinary. Other areas of concern with which this part of the plan will deal are the organization of the growing number of interdisciplinary graduate study and research programs, the problems of off-campus instructional programs, and proposals for a process of internal and external review of all graduate/research programs. Finally, we shall consider certain other concerns, each of which affects the successful maintenance of a graduate and research program. We shall discuss and offer projections regarding optimum numbers of graduate students, sources of financial support, supporting services and space requirements.

1. FUTURE GRADUATE/RESEARCH PROGRAMS

A section of the preceding chapter dealt with future instructional programs. In this section we shall discuss some of these programs with respect to their potential for research.

Discipline-Based Programs

The School of Architecture, in accordance with its original goals, plans to establish a Master of Architecture program to provide for its graduates, and graduates of other schools of architecture, an opportunity for advanced study. The School has already begun to develop a research program to support this academic offering.

The purpose of this program will be to provide opportunities for advanced study in a variety of specializations such as structural design, historic preservation, alternate energy systems, industrialization, building-science research, environmental psychology, construction management, computer-aided design, etc. Emphasis will be placed on using interdisciplinary resources designed to accommodate the individual student's needs and interests.

The faculty of the School of Architecture, in cooperation with faculty from the Psychology Department of Rutgers University, is developing a research program intended to stimulate the architectural interest in children.

Some other areas in which the Institute plans to develop programs within existing degree offerings, all with research components, are:

Civil Engineering - Hydraulics, public health, rock mechanics, engineering geology.

Electrical Engineering - Expansion of an option in Communication Systems, Electromagnetic Fields and Waves, Microelectronic Devices and Circuits, Thin Film Technology, and Microprocessor Technology.

The Department of Organizational and Social Sciences plans:

1. To develop a program leading to the Professional Diploma in Human Resource Management and Organizational Behavior designed primarily for practicing managers working in human resources management. This program will provide them with graduate training at a level intermediate between the Master's degree and the Doctorate and prepare them directly for middle-management and executive positions.

2. To develop a doctoral track in Human Resource Management and Organizational Behavior within the Organization and Operations Management area of the joint Rutgers-NJIT Ph.D. in Management program.

Both programs will involve research.

Interdisciplinary programs

The School of Architecture and the Department of Mechanical Engineering are cooperating in an interdisciplinary research program involving energy efficient and participatory design. A team of architects and mechanical engineers has designed and carried out the rehabilitation of an abandoned frame structure as energy efficient student living quarters. The team expects to use this first effort as a model for additional projects to revitalize urban neighborhoods.

The Institute faculty is planning to initiate other interdisciplinary graduate/research programs in:

- Energy
- Instrumentation and Control
- Occupational Health and Safety
- Law and Technology
- Human Communication.

Some of these efforts will include additional courses and possibilities for additional options within existing programs. Others will call for new degree programs. All will have a strong research component.

In addition, the Institute plans to expand the activities of existing interdisciplinary groups. For example, the environmental engineering team is projecting two new areas of concern: effects of new energy technology on the environment (a research program associated with the existing environmental engineering program); and environmental toxicology (jointly with CMDNJ).

Additional research programs planned for expansion include biomedical research, materials processing and manufacturing methods, and polymer science and engineering.

2. ORGANIZATION OF INTERDISCIPLINARY PROGRAMS

Interdisciplinary programs have traditionally encountered management problems. Particularly in universities, difficulties arise in rewarding individual participants, in obtaining needed personnel, in competition for limited resources, etc. At NJIT, we have developed each interdisciplinary program through a committee of interested faculty from the appropriate disciplines. These committees have assumed a range of responsibilities among which are:

1. Administration of degree programs (e.g., Environmental Engineering)
2. Review and recommendation of proposals for new courses and research projects.
3. Organization of research programs.

Programs which have transcended the difficulties alluded to in the preceding paragraph have been among the outstanding research programs of the Institute, and we propose to continue this committee structure in the development of new interdisciplinary programs.

A second approach which we will use to meet the needs of future graduate and research programs is the development of Institute research centers staffed by the faculty of NJIT and non-tenurable Center researchers. We anticipate that these center researchers will have substantial percentages of their salary paid from research grants. These Centers will be particularly appropriate for interdisciplinary research and, perhaps, for large single-purpose projects.

3. SIZE OF THE GRADUATE AND RESEARCH PROGRAM

It is clear (see Figs. 2.4 and 2.5) that NJIT's graduate enrollment peaked in 1974 at just under 1,100 students, or approximately 500 FTE students. Since that time enrollment has dropped to 930, or approximately 430 FTE students, a drop of 12%. The effect on the graduate and research program has been twofold. First, some specialized courses have been cancelled so that some students have experienced difficulty in completing their programs as planned. Second, as graduate enrollment has dropped, research funds have increased leading to increased research opportunities for full-time students. The need to increase graduate enrollment both part-time and full-time is therefore evident.

In the near future it is anticipated that the number of doctoral students will increase as a result of increases in funded research, but it is not expected that the percentage of graduate students on the doctoral level will change substantially. When the 550 FTE student level is maintained, very few advanced courses will be cancelled and all of our programs will operate efficiently.

A significant proportion of NJIT's full-time graduate students are NJIT graduates. We anticipate that this will continue to be the case for the time being. We hope, in fact, to attract additional NJIT students to our graduate program, and to that end plan to do the following:

-Increase research funds from the NJIT Foundation to involve undergraduates--beginning at the junior level--in our research program.

-Incorporate, whenever possible, funding for support of undergraduate students in proposals to outside agencies.

In these ways we hope to integrate more effectively our research program and our undergraduate academic program (and, thereby, to improve the quality of our undergraduate education) and to attract our best students to graduate studies.

In addition, we will make every effort to attract undergraduates from other colleges.

The Department of Chemical Engineering and Chemistry, for example, has initiated a program of faculty visits to the chemical companies and colleges in New Jersey, Pennsylvania and New York, in the hope of recruiting qualified part-time and full-time students. Brochures describing specific NJIT graduate programs have been prepared for this initiative. Should the results prove to be worthwhile other departments will be encouraged to develop similar recruiting programs.

4. THE RESEARCH PROGRAM REVIEW PROCESS

Because of the research content, the review process required for graduate/research programs differs from and is less uniform in its operation than that for accredited undergraduate programs as discussed in Chapter V.

The Institute Committee on Graduate Studies and Research, a subcommittee of the Committee on Academic Affairs and one which interacts with all the graduate level academic and research programs, is the Committee which plays a key role in the process of program evaluation.

Since a variety of reviews may be desirable, the Institute plans to set up both an internal and external review system. The review system for a particular program will be determined by the specific circumstances that exist at the time.

A subcommittee of the Graduate Studies and Research Committee will be set up for each of the graduate/research programs of the Institute. These review groups will coordinate their activities with the academic department(s) involved. The review subcommittee will report its recommendations to the Graduate Studies and Research Committee which will review these recommendations along with the regularly scheduled reports from the research team.

All programs will be reviewed automatically at least biannually. There will be a complete, in-depth review of the entire graduate and research programs once every five years.

Review Criteria

Because of the diverse nature of the programs, no simple formula can be used for evaluation. However, the following are some of the factors which will be considered:

- academic excellence
- contribution to the public and to the State
- uniqueness of program
- age of program
- number of students
- economic viability
- productivity
- Institute resource commitment.

5. FINANCIAL SUPPORT FOR GRADUATE AND RESEARCH PROGRAMS

Since it seems probable that Institute income from the State "formula" funds will not increase, it is important to ask how NJIT is to develop the costly new graduate and research programs necessary for it to remain current and responsive to the needs of its students, and to the State of New Jersey.

For the current fiscal year we are spending 1.5 million dollars on research. (See Figure 2.6.) During the spring semester there were 58 faculty members (16% of the full-time staff) involved in funded research projects. Within the next five years we estimate involvement of an additional 40 faculty, including members of the School of Architecture which will be adding a graduate program.

It must be remembered that the primary purpose of research at NJIT is the education of our graduate students. As our enrollment goal of 1000 to 1300 students is reached, we may expect about 40 per cent or 500 students to be actively involved in research projects or theses during any given semester*. Thus, we will have about 5 graduate students per research faculty member. However, research faculty are more likely to work with the full-time in-residence students, of which there may be only 100, a not unreasonable number when one considers that 5% of our graduate enrollment consists of foreign students most of whom are full time. Thus, there would be approximately one full-time graduate assistant per research faculty member. This ratio is not adequate and, as a result, our effort to encourage additional graduate student enrollment should be accompanied by an effort to encourage more full-time students.

Projecting from the present expenditure of $25,000 per year per faculty member performing research, a rise of research expenditures to a minimum of $2,500,000/year is anticipated in the ensuing 5-year period. To this amount must be added the costs to the Institute not covered by research overhead, costs such as tuition remission for students, stipends for some students who are not working on externally-funded grants, costs of utilities and space (including remodeling), and incremental costs of instruction. This last item is the Institute's portion of the expense of covering academic classes for the released time granted to the research faculty member.

These costs to the Institute make it necessary to establish a limit to research growth relative to overall Institute size. These costs should be accurately determined and an appropriate maximum research expenditure should be agreed upon.

Non-Funded Research

As at any major academic institution there are important research and graduate programs which do not attract outside support as readily as our engineering programs do. Yet it is vital that such scholarly efforts be encouraged and supported by the Institute. To maintain the high quality of, for example, our mathematics graduate and undergraduate program it is essential that our mathematics faculty continue to engage in scholarly activity. Mathematics faculty, however, do not enjoy the same potential for attracting outside funding to support their research and graduate programs that engineers do. The Institute has been providing teaching time reduction to faculty operating in programs not as likely to gain outside support for their scholarly efforts.

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*See Table 4.2. Thesis or project work is required of all graduate students as part of the degree requirement.

Partly as a consequence of the institutional efforts to foster the development of scholarship in all our departments, including those not likely to receive external funding to support their scholarship, there has been a substantial growth in the number of scholarly publications by the NJIT faculty, 75% over the past 5 years. This growth in the number of scholarly publications is a measure, more inclusive than the amount of external funding, of the developing scholarly program at the Institute. The Institute plans to continue supporting faculty scholars by selectively reducing teaching loads, and by providing the ancillary services (photocopying, typing, support for travel, etc.) that such activities require.

The Institute has rarely drawn funds from private foundations. In the years to come, it fully expects to mount a more aggressive program for obtaining research funds from such foundations. We anticipate that some of our ancillary needs will be met in this way. For example, we are planning to buy equipment, and purchase or rent space with some of these funds.

A second source of funds is our Foundation affiliate. The Foundation was organized to develop a research program at NJIT and having done that very successfully has now undertaken a general development mission.

6. RESOURCE AND SUPPORT REQUIREMENTS

In the discussion above of expanded graduate and research programs, brief mention was made of the expenditures anticipated. In this section overall plans are given for the required resources in research personnel, support staff and space, and sources of funds are discussed.

Resources

The development of new graduate programs usually requires the supportive development of laboratories or, in the case of a Master of Architecture degree, the development of advanced design studios. The graduate laboratories already in existence at the Institute have been funded from three sources: the Institute budget, the Foundation, and research grants. For the future, we plan to supplement these funding sources for any new graduate laboratories by submitting proposals to NSF under the aegis of their research equipment program, to aggressively seek private Foundation funding, and to pursue in a methodical way the availability of used industrial and governmental equipment.

Of all the program options in which the academic departments and interdisciplinary teams are planning to engage their energies, only the development of a Mechanical Engineering Energy Laboratory and advanced studios for the Master of Architecture degree will require substantial capital expenditues. In the development of both of these projects supplementary funds from private sources will be sought.

In the past, equipment for research graduate programs has been procured almost completely from grant money. We expect this source of equipment funding to continue, providing NJIT with most of its research equipment needs. On occasion, we shall tap other sources, i.e., separately budgeted research funds, the Foundation, industrial equipment gifts, and surplus equipment from the United States Government. We expect these sources to satisfy our most pressing needs in the research area.

Research Support Personnel

Support personnel for research at NJIT has traditionally been minimal compared with other research-oriented colleges.*

Our present laboratory technician support is far from adequate for a vigorous graduate and research program. As a consequence, most researchers are forced to work as their own technicians--building, repairing and cleaning equipment, preparing experiments, etc. The need for researchers to perform such tasks retards the progress of the research and graduate programs.

At present, there are 10 technicians at the Institute supporting graduate and research efforts. Based on one technician per $100,000 of research expenditure, there should be 15 to support the current program. If we are to increase research expenditures to $2.5 million in the next five years, technicians will be necessary. Most of these additional technicians must be supported by grant funding since Institute funds and gifts are not likely to be available for the purpose.

At institutions with vigorous graduate research programs, one secretary supports the efforts of 3 research faculty. For the research faculty projected in five years, 32 secretaries would be required. Again we are faced with the situation that Institute funds cannot be anticipated for the research support required. To reduce the cost, we plan to set up a secretarial pool by identifying those secretaries presently employed by the Institute who would be willing to type manuscripts, reports, papers, proposals, etc. on their own time for additional compensation. Past experience indicates that providing certain kinds of secretarial service in this manner can meet much of the Institute's future research support needs.

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*See Table A6.1 of the Appendix.

Because of the expanding research program, there will be an increased demand on other Institute services, such as library, computer services, machine shop, modeling shop, mechanical and electronic instrumentation shops and drafting.

Other resources that must be increased to support research and graduate study programs are accounting, special services, and physical plant personnel. Expansion of research expenditures to the 2.5 million dollar range will require the service of an accountant specializing in grant accounting.

If the Institute budget remains essentially constant for the next five years, it is imperative that other sources be sought to satisfy the demand for additional resources and services. Up to now we have used overhead recovery from grants and contracts to pay overhead costs and to provide seed money for research development. In the future, much more of the overhead money must be used to pay for secretarial services, special services, physical plant, etc. Funds to pay for the development of research will come from development funds. If, in five years, we increase our research expenditure to 2.5 million dollars, we can expect to recover about $325,000 in overhead.

Space

From every point of view, the space available for carrying out all of the Institute's responsibilities is grossly inadequate. The space available for carrying out one of our major functions, research, is particularly so. Most laboratories are so crowded that research personnel have great difficulty organizing and conducting experiments. There is no room for the expansion of activities in most existing laboratories and little possibility of introducing new experimental efforts.

Presently, 34,000 square feet of Institute facilities are being used for research space.* This figure does not include office space used for research activities, nor does it include the space needs associated with the service organizations so vital to the proper functioning of a research program. If one considers that we are presently functioning with 58 faculty members, the available area averages 586 sq. ft. per research faculty member. Table 12.6B shows that if we consider all full-time faculty, research space averages 334 sq. ft. per person and varies greatly by academic department, depending on the nature of the research as well as the percentage of faculty involved.

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*See Tables 12.6B and 12.7

Further increase in research from the present $1.5 million to $2.5 million in the next five years, assuming constant average usage per research dollar, will require an additional 23,000 square feet.

CHAPTER VII CONTINUING EDUCATION

1. MISSION

In the process of making higher education more generally available, one trend that has emerged is the extension of educational services to a new clientele which includes mature students in mid-career having varied academic backgrounds and objectives different from those of the traditional college student. In providing these services various strategies are needed, including flexibility in time schedules, course calendars, and locale, as well as different instructional techniques and scope of subject matter.

The Department of Higher Education's Advisory committee for Continuing Education prepared a draft report* in which it is recommended that primary responsibility of the N.J. public colleges for professional credit and non-credit continuing education courses should be assigned to Rutgers and NJIT. Furthermore, the report states two general principles:

> "The major goal of continuing education is to extend the particular resources of each institution to the community-at-large in the form most needed by the community.
>
> "Each institution should offer activities and courses of study which reflect the knowledge and expertise of its faculty and staff."

NJIT's location in an area replete with high technology industry and research laboratories, its reputation and historical role as the principal New Jersey source of talented professional technical personnel, and the expertise of its faculty; all are facts from which one can draw the conclusion that NJIT should assume a major leadership role within the State of New Jersey in continuing technical/professional education, with courses ranging from state-of-the-art offerings in new fields to more formal course work for certification programs for state or municipal licensing.

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*A Report on Adult Continuing Education Activities of N.J. Public Colleges and University (Draft)", D.H.E., Trenton, January 1977.

2. CONTINUING EDUCATION IN PROFESSIONAL FIELDS

Continuing education for technical/professional personnel has been rapidly expanding because these highly trained people must keep up with new technological developments and the means for exploiting them.

> During the working years of a professional man or woman, roughly between the ages of 25 and 65, a critical issue is whether he or she can maintain a high level of competence against the eroding effect of the passage of time. Scientists and engineers are especially threatened by the potentiality of becoming outdated in their skills and their knowledge. It is not enough for workers in these fields to maintain the competence acquired in the years of formal education. Their information bank is anything but static; the norm is perpetual change. Scientists and engineers have no choice but to plan for a life of continuous self-education and self-renewal by keeping abreast of new developments and new knowledge which are constantly being generated by research.[1]

The rate of technological advancement today is such that is is impossible to accurately measure the rate of change of technical information in a particular area. Estimates for the half-life of information for engineers, scientists and physicans [1,2] range from a low of 5 to a maximum of 10 years. This rapid technological advancement or "technology explosion" requires an individual to plan a life of continuous self-education. Latest U.S. Bureau of Labor statistics indicate that professional/technical personnel who live within the State of New Jersey number over 170,000.* It is evident that these professionals need continuing education and that there is a significant population that NJIT can directly serve.

Courses offering continuing technological education can be classified as follows:

1. SHORT COURSE -- Intensive programs given at the college, lasting from one to several weeks, that focus on specialized subject matter and that can attract students from across the nation.
2. EVENING CLASSES -- Typically offered after hours and extending over a period of several weeks or months, these courses permit the student to reflect on the subject matter, prepare assignments, relate the newly acquired knowledge to his work, and formulate questions between sessions. Such courses generally serve only local area students or those within an hour's commuting time.

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[1] S. Dubin, "The Updating Process", July 1, 1977.

[2] I. Katz, "Continuing Education in Science and Engineering", July 1, 1977.
(Both were conference papers prepared at the request of the National Science Foundation Science Education Directorate.)

*See Table A3.2 of the Appendix.

3. WORKSHOPS -- Small groups that meet to discuss selected topics and differing viewpoints so that new insights into the subject matter may be developed.

4. IN-PLANT COURSES — Classes or workshops given to a group of employees in the plant, usually during working hours.

5. SEMINARS -- One or more lectures, conducted by one or a panel of lecturers on a particular subject, followed by audience questions and discussion. These may be known as institutes or conferences and may have regional or national drawing power.

6. SOCIETY SYMPOSIA — Series of lectures sponsored by a particular society and focusing upon a variety of topics of general or special interest.

7. ETV — The transmission on television of live or recorded sessions to a dispersed audience. In a closed system, students are able to ask questions and receive prompt answers.

8. BLACKBOARD-BY-WIRE — The telephone transmission of usually live lectures and graphic presentations to which students can respond.

9. INDEPENDENT STUDY -- Self-study by the student of reading or prepared lesson material followed by the preparation of a written response which then receives individual attention by a faculty member.

10. SUMMER COURSE -- short course conducted in the summer.

11. VIDEO SHORT COURSE -- A self-study program in which traditional classroom lectures are video-taped. Outside reading is assigned from standard textbooks. Problem sets and problem solutions are provided in the form of study guides.

It is useful also to categorize sources of continuing education students, which are:

1. BUSINESS AND INDUSTRY — Group of employees from a single business or industrial corporation.
2. GOVERNMENT — Group of governmental employees.
3. PROFESSIONAL SOCIETY -- Group of students from different employers but members of a professional society.
4. INDIVIDUAL -- Individual taking a course with students from different employers.

Programs can also be classified as to location:

1. ON-CAMPUS
2. EDUCATIONAL INSTITUTIONS -- Leased rooms at other college and schools.
3. RENTED FACILITIES — Rented halls at motels and conference centers.
4. IN-HOUSE -- Facilities furnished by the employer of the students.

3. CURRENT STATUS

The Division of Continuing Education offers programs in each of the first six classifications itemized in the preceding section. They are given for all the student categories and at all of the various locations listed.

The subject matter of the course offerings falls into one of four basic categories:

1. Basic Technology Fundamentals
2. New Technology: "State-of-the-Art"
3. New Methodology
4. New Government Regulations and Codes.

The programs offered and the geographical sources of registrants are tabulated in Table A7.1 of the Appendix.

A numerical summary of operations over the past four years was given in Table 2.9 which indicated a stable enrollment in the neighborhood of 1000 registrants per year.

During the current fiscal year the staff, which has hitherto consisted of one professional and one secretary, has been augmented by 1/2 FTE professional and 1 clerical employee, and the number of courses and expected enrollments have been increased to 44 and 1200, respectively, as currently projected.

4. FUTURE ROLE FOR THE DIVISION OF CONTINUING EDUCATION

The preceding discussion indicates the need, and the opportunity, for a considerable growth in the Institute's role in technological education for New Jersey. It has been estimated that each professional/technical person should devote a minimum of one week per year to continuing education in his field. In New Jersey, with 170,000 such employees, one week or 30 hours of instruction would yield the astounding total of five million contact hours of continuing education course work. A growing awareness on the part of employer and employee of the need for commitment to continuing education will increase enrollments in this area but enrollments will not reach their potential until a vastly increased number of specialized courses are offered at convenient times and locations for students having various academic backgrounds and past experience.

Recently industry has tended to train key personnel in new developments by means of "in-house" seminars. The Division should develop the capability of supplying a number of programs for such audiences. The majority of programs developing in this area are in the applied science and engineering fields. The Institute's strength lies also in the areas of industrial management, product liability, technology assessment, etc. These areas may elicit a significant clientele in business and government.

Although its major growth will most likely occur in the Business, Industry and Government categories, it is apparent that the Continuing Education Division should also expand its present offerings to students in the individual category. Many professsional/technical people work in small industries or are the lone representative of a technical area in a larger industry. For them, in-plant continuing education courses are not economically possible but they and their employers are eager to participate in relevant courses offered at locations near enough that travel time is not excessive.

An area that has not been broached is that of independent and video short course programs. The viability of such programs should be explored in discussions with local industry, business and government. The video short course is being strongly developed by colleges in other industrial states and several national professional societies. This may be one of the primary CE programs of the future. The major conclusion to be drawn from this review is that a comprehensive program to develop industrial, business and governmental contacts should be initiated.

Plans for Development

In order to move toward the stated goal, five objectives have been outlined for the immediate future.

1. The first objective must be a thorough study of the potential market to ascertain continuing education needs that NJIT can fulfill.

Having determined which segment or segments offer the most promise, NJIT will develop the type of program which best fulfills the customer's needs. The market analysis may result in several distinct types of programs to be offered by the Continuing Education Division. Suggestions from the Division's Industry Advisory Council will be an integral portion of the marketing program.

2. Next, we must market the continuing education programs we have developed. One segment of the CE programs is to be directed to the Individual Student category, as explained above. This type of program requires an intensive marketing and sales campaign. The image and prestige of the Institute directly affects the "saleability" of the programs. A concerted effort to improve the image of the Institute must be made, and program advertsing must be developed.

3. Third, we must obtain from the State financial support for continuing education programs.

While in many instances continuing education programs are and should continue to be self-supporting as far as direct costs, there are needs of small business for specialized courses for small numbers of students. Such courses may be offered in-plant by the industry's larger competitors, but cannot be completely self-supporting elsewhere. Also there are needs for licensure and certification courses for individuals for which there is no employer to share the burden of expense. For courses such as these, NJIT must persuade the State that, in the interest of public service, it should share in the direct expense, either through grants or D.H.E. formula-generated budget funds.

The other component of expense is administrative costs. The Advisory Committee for Continuing Education concluded that

> "Part of the direct administration costs can also be self-supporting, but part of direct administrative costs and all indirect administrative costs are not, and cannot be self-supporting. In higher education these administrative costs should receive a State subvention similar to the State's support of administrative costs of adult education programs funded through the Department of Education."

The primary objective of the continuing education programs at NJIT is to service the technical/professsional educational needs of the residents of the State of New Jersey. It is esssential that all segments of this population be served. To accomplish this mission a portion of the expensess must be carried by the State of New Jersey. If support is not obtainable many courses of significant educational value but limited market will have to be abandoned.

4. It is also necesssary for us to establish a procedure for granting formal recognition for each student's endeavors.

The Continuing Education Unit, CEU, is a standard which many institutions have adopted to give recognition to persons continuing their education in non-credit courses.

5. Finally we must establish a balanced teaching staff of adjunct instructors from business and industry and permanent faculty from NJIT.

A balanced staff of members from both industry and the present teaching staff of the Institute will give the greatest breadth and stability to the continuing education program. It is expected that the breadth of course offerings would encompass all discipines of the Institute.

CE Course Instructors

Two distinct categories of faculty are involved in continuing education programs: permanent instructional faculty; and adjunct members from business or industry. To date there does not seem to be a national trend as to faculty composition. Analysis of limited data indicates that the majority of the "state-of-the-art" courses are taught by adjunct faculty. This reflects the fact that the majority (approximately 80%) of the new technology is developed in the industrial environment. Those courses dealing with basic fundamentals are usually taught by staff of both types. Apparently the main factor determining the type of staff used is the compensation policy of institution. Most persons directly involved with continuing education programs recommend a balanced staff to maintain continuity and stability.

Faculty Compensation

To develop a vigorous year-round continuing education program it is essential that a balanced staff be assigned to it. Compensation for adjunct staff can be arranged on a contractual basis. For permanent faculty a dual system should be developed. During non-academic periods permanent staff can be compensated by a contract arrangement. The problem most institutions have not solved is how to compensate a full-time faculty member during the academic year. This is a complex problem, often involving elaborate course preparation, course calendar differing from the academic semester, team teaching with a partner from industry, travel time to and from off-campus locations, and unusual teaching hours.

Since a concerted effort must be made in the near future if NJIT is to succeed in this enterprise, it is advisable that ample incentives be given to faculty members to make continuing education teaching desirable.

Resources Required

The growth of the CE Division of NJIT will depend upon the degree to which the Institute obtains additional funds for its operation. If the present self-supporting funding program is continued, the degree of growth will be minimal. Today continuing education is growing rapidly with many groups entering the field. If the Institute is not agressive in claiming the market within the State of New Jersey others will assume this technical/professional responsibility.. It is evident that the Division must have additional funds and personnel to:

1. obtain a market picture
2. develop liaisons with business, industry and government
3. develop programs

Based upon the work of Svenson[1] and others it will require about three years to develop this cycle. Previous experience indicates that one professional can handle approximately 6 to 20 course feasibility studies per year depending upon the complexity of the project. Conservatively it is estimated that the continuing education staff should be increased by a minimum of 2 full-time members to perform the marketing analysis and develop the programs. In addition, the Institute must initiate a dynamic public relations campaign for all its divisions, including the Continuing Education Division. If the staff is increased as proposed, the Division will need adequate office facilities comparable to any other major function of the Institute.

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[1] Svenson, R.A., "Market Analysis and Product Planning for Continuing Education and Training", Monograph No. 2, Bell System Center for Technical Education, Jan 11, 1978.

CHAPTER VIII THE MISSION OF PUBLIC SERVICE

The public service mission of New Jersey Institute of Technology is both pervasive and invisible. The mission impinges on nearly every aspect of the Institute's programs and operations. The scope is large but so diverse that it does not receive the recognition it deserves, either from the faculty, staff, and students involved, or from the public who are its beneficiaries.

The public to be served must be broadly defined. It includes the citizens of Newark and the State, the employed professionals residing in New Jersey, and the business, industry and government of the State. Each of these groups has particular needs which the Institute attempts to serve in a variety of ways.

The informal policy of the Institute is to offer its personnel and facilities for public service activities in those areas where we are uniquely qualified to serve, and where we can help with relatively modest expenditures of the Institute's resources. Since there is no budget, per se, for public service, expenses are borne by external grants and the operating budgets of the departments involved. Because faculty lines provided by the State are meager, faculty participation is voluntary and uncompensated, or closely related to educational and research activities.

The public service role of the Institute must be more clearly defined and more adequately funded. Toward these ends, a Public Service Task Force should be appointed to study the Institute's role and to recommend courses of action. Possible actions would include establishment of a Center for Educational Outreach, requests for additional State funding specifically for public service, and seeking of private funding.

Public service activities may involve various elements of the Institute's programs, including educational efforts, research endeavors, community interactions, and facilities sharing. There is, in fact, no clear dividing-line between public service and the Institute's educational and research activities.

1. THE URBAN MISSION

Located in the largest city of the most urbanized state, New Jersey Institute of Technology must have a special commitment to meeting the urban challenge. Much of the Institute's current public service effort is focused on urban problems.

Our commitment is exemplified by the widely-publicized conference on An Assessment of Newark, 1967-77, held on the Institute's campus in October 1977. Cosponsored by our urban academic neighbors (ECC, CMDNJ, Rutgers-Newark), the conference drew 530 participants and produced 60 scholarly papers on the vital aspects of Newark's development. The conference, organized by an Institute faculty member, had a very positive impact on the attendees. Proceedings, which have been published and disseminated, will carry the messages of the conference to a broader audience.

NJIT students are often involved with faculty in addressing urban problems. Courses in various fields have brought students, faculty and city offices in contact on technical and educational matters. Student interns have worked in Newark's traffic, sanitation, planning, and other divisions to prepare reports for course credit that were then submitted to municipal officials.

Architecture students and faculty have sketched, photographed, and researched city landmarks. They have established a non-profit corporation to purchase and rehabilitate a house in Newark for use as an energy-efficient student residence.

An architect/engineer team is being assembled to develop techniques for rehabilitating urban neighborhoods.* We hope to work more closely with city agencies to help solve the technical problems facing the City.

The Institute makes its facilities available to a wide variety of community groups, ranging from the Newark Housing Authority to the NAACP. During the summer months, the Institute's pool and athletic facilities are opened to community groups on a scheduled basis.

While not neglecting its broader public, the Institute must pay special attention to the needs of the citizens of the inner city. We have been involved in several pioneering efforts, but much remains to be done. To address these issues, it may be desirable to establish a Center for Urban Action, to focus and expand our involvement.

2. PUBLIC SERVICE IN THE STATE

Institute faculty and students frequently provide free consulting services to local and State governments, and to non-profit agencies. A few examples will suggest the diversity of the services.

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*See Chapter VI, Section 1.

1. A team of students and faculty studied the extent of ground water contamination in the Pleasant Plains section of Dover Township, Ocean County, to enable the State to trace the degree of contamination by certain chemical substances which had leaked from their containers into the ground water.

2. A team of faculty and students assisted in processing a backlog of stream encroachment applications submitted to the State.

3. An analysis was made for the Department of Environmental Protection of a proposed tank farm in Jersey City.

4. A team of students and faculty performed energy audits for two New Jersey school districts to further energy conservation efforts.

5. Faculty members provided Department of Community Affairs Commissioner Patricia Sheehan with an analysis of alternatives available for construction of high-rise apartments in the Meadowlands, offering an objective view of a controversial subject.

It must be emphasized that these services are provided without charge — and without direct support from our State budget. While the Institute would like to expand these efforts, it must seek funding to allow for such public service activities by the faculty.

3. INDIVIDUAL FACULTY INVOLVEMENT

In addition to the team efforts described above, many NJIT faculty and staff have personal commitments to public service and professional activities at the local, state, and national level. These are too numerous to detail, but a few examples suggest the diversity of efforts.

Local Involvement:

Chairman, Newark Parking Authority
Advisory Board, University High School
Advisory Board, Office of Newark Studies
Chairman, local section of a professional society

State Involvement:

Advisory Board, Marine Sciences Consortium
Board of Directors, Energy Research Institute
Environmental Consultant, Hackensack Meadowlands Development Commission

National Involvement:

President, national honorary chemical engineering fraternity
Vice-President, American Society for Engineering Education
Member, and subcommittee chairman, Committee on Minorities in Engineering of the National Academy of Engineering

Here again, commitments are limited by failure of the State to fund the public service function at an adequate level.

4. EDUCATIONAL INTERACTIONS

There is a clear interaction between the Institute's traditional educational function and its developing public service activities. In fact 'Public Service' might denote educational activities not specifically funded by the State. And therein lies the rub. Many of these activities provide vital services - but they must be funded by private and federal grants, or by draining other resources - because of lack of State recognition of the urgency of these efforts. A few examples:

1. With involvement of engineering faculty, the Institute sponsors an Explorer Post of the Boy Scouts for inner city residents.
2. The Institute's Admissions Office sponsors a series of Saturday minicourses, to acquaint high school students with recent developments in technological fields.
3. NJIT is the organizing force and headquarters of the New Jersey Engineers Committee for Student Guidance, which provides speakers to groups around the State.
4. The Institute sponsors a Speakers Bureau for educational and civic organizations in New Jersey.
5. The summer Urban Engineering Program for high school students has consistently obtained national funding.

6. NJIT faculty members of Sigma Xi, national research society, have sponsored a highly successful program of research awards for high school students throughout the State.
7. Federal funding makes possible an energy institute for high school teachers from throughout northern New Jersey.
8. After several years of interaction with 'School within a School' at Shabbazz High School in Newark, NJIT has leased one of its buildings to SWAS' reincarnation as University High School, for $1 per year.
9. At the request of Science High School in Newark, NJIT is providing laboratory experience for high school students.

Because of the increasing effort required and opportunities available in the Institute's educational public service endeavors, it is essential that a coordinating office be established, a Center for Educational Outreach. This is a function not yet recognized by State funding formulae, but essential to any institution of higher education attempting to serve all the people.

5. RESEARCH INTERACTIONS

Many of the Institute's funded research projects have strong public service components. Indeed, the Institute seeks to develop strong ties with State agencies to provide its expertise wherever applicable. The university's role in agricultural extension services is well-established throughout the United States. The emerging role of urbicultural extension services must be recognized, especially in the nation's most urbanized state. Several examples suggest possibilities:

1. NJIT faculty and students completed a study of alternative uses of Newark's Pequonnock Watershed.
2. The Institute's Center for Technology Assessment conducted a study of energy conservation in homes of elderly persons on welfare, to lay the groundwork for a possible research grant.
3. The Institute's faculty wrote a manual dictating conditions and constraints for construction on flood plains in New Jersey.

4. A major program was launched to determine the environmental impact of proposed water pipelines in central New Jersey, funded by the State of New Jersey.

Beyond these specific examples of research on urgent State needs lies a much larger effort addressing national needs. The Institute is actively involved in federally funded projects to address these priorities, including environmental, energy, and health studies. Appropriate seed money from the State, in the form of separately-budgeted research, can reap enormous returns.

6. THE PUBLIC SERVICE POTENTIAL

New Jersey Institute of Technology is barely on the treshhold of its potential public service contribution. With proper State support, the Institute can become a leader in public service activities. The present policy of taking much of its public service time out of the fabric of the Institute's other activities must be replaced by a rational pattern of State subsidy. The return can be much greater than the initial subsidy. To this end, the Institute must seek greatly increased allowance for public service by its faculty.

IX FACULTY CONCERNS

1. INTRODUCTION

The principal activity of faculty is teaching. Indeed, the words "faculty" and "instruction" are all but synonomous to many people. But in order to sustain an advanced, fluid, and responsive education, then an intricate network of auxiliary services must be maintained in addition to classroom, laboratory and studio-based instruction. Faculty are, of necessity therefore, also engaged in a wide spectrum of responsibilities ranging from counseling of individual students, advising in fiscal matters, forecasting shifts in the educational needs of the populace, establishing research directions, remaining current in an age where information expands at mercurial rates, briefing the public via speeches/workshops, writing of books and articles, and so forth. These activities fall under the general provenance of faculty being custodians, communicators, inseminators and defenders of the nation's cultural riches. This provenance can be exercized collectively or individually under the telling mantle of academic freedom. Consequently a critical self-assessment of faculty, such as being undertaken here, will raise issues that are at once both mundane and profound, simple and complex, clear and ambiguous, altruistic and commercial, routine and experimental, embracing the obviously acceptable and the highly argumentative.

The various sections which follow these introductory remarks focus on those aspects deemed most critical to an effective operational structure of faculty. Included are:

Allocation of Faculty Positions
Faculty Development
Promotion and Tenure
Faculty Governance

While each section internally discusses sets of relatable issues, none of the sections can be considered autonomous. Each must be interpreted in concert since all are mutually supportive. The section on allocation, for example, raises the very thorny issue of how the Institute can shift faculty to provide new educational content in response to changing societal needs as evidenced by a newly emergent student population base in times of fiscal entrenchment. This may require a quick retraining of certain faculty as part of their developmental sequence which, in turn, implicates the entire faculty's willingness to highlight such retraining in salary matrix adjustments, in promotion and tenure proceedings, in released time strategies, etc., thereby involving attitudes towards faculty governance as well. The linkages between sections are both real and unavoidable.

Finally, it should be clearly understood that these various sections deal somewhat exclusively with the operational structure of faculty action. Excepting for purposes of elucidation, the sections do not discuss the specific situations to which the structure could and would be applied. Still less do the sections address the aspirational context of the faculty's educational ambitions. Yet a firm delineation of the operational structure, and its mechanics, is considered to be a mandatory first.

2. ALLOCATION OF FACULTY POSITIONS

The NJIT faculty faces a major challenge in matching resources to tasks to be accomplished. The faculty is the keystone in fulfilling the Institute's diverse missions in education, research, and public service; but chronic state under-funding of the Institue, particularly in regard to faculty positions, has seriously diminished the faculty's ability to meet the Institute's objectives. Given New Jersey's tradition of minimal funding for higher education, it seems unlikely that the Institute's state appropriation will ever provide an adequate number of faculty positions; so that it is of vital importance that available faculty positions be more effectively assigned and utilized than at present, to cope with the high average workload.

Traditional Institute methods of allocating the faculty positions authorized by the State has provided little flexibility to departments in meeting their responsibilities in teaching, research and public service. The centralized approach to the assignment of positions based on a department's total teaching hours plus released time for research, educational development and departmental administration, also provides little incentive for the department to increase its productivity in one area so as to release resources to concentrate them in another area that may need improvement.

Revision of the present system of allocating faculty positions to departments is a major goal of the Institute. Any such revision much be approached carefully. It must be sensitive to traditions that have led to NJIT's reputation as a student-centered teaching institution. At the same time, a system of allocating faculty positions must be responsive to new challenges in research and public service.

A major objective of a new allocation system would be to allow greater flexibility within a department in the use of faculty positions in teaching, research, educational development, departmental administration, and public service. NJIT departments have differing missions and differing challenges at a given point in time. More flexibility would enable a department to meet its challenges more effectively. For example, a department might experiment with larger section size in basic courses (if larger classrooms are available) in order to offer a greater number of advanced electives of lower enrollment. A department might choose to count an hour of graduate teaching as more than an hour of undergraduate recitation, while counting a laboratory hour as less. A department might temporarily allocate more time to research in an effort to increase external funding which in itself could generate more faculty positions. The greater flexibility for departmental allocation of positions would require some broad Institute-wide guidelines, as well as a system of monitoring and accountability.

The most difficult task in providing this greater flexibility is the development of an equitable and effective system of allocating faculty positions to departments. A formula that is attractive to one department may prove to be detrimental to another. It is doubtful that any simple formula (such as one based on the state-defined equalized credit hours) will prove equitable to all departments. A system involving judgments of a department's role in fulfilling the Institute's mission will be needed. While no allocation system is likely to satisfy everyone when too few total positions are available, the highly desirable goal of greater departmental flexibility should prove attractive to all concerned.

Revising the Institute system of allocating faculty positions to departments will require close cooperation of the faculty and the administration to address complex and sensitive issues. For example, while the system should take into account long-range trends in the total student enrollment in a department's courses, it should not be overly responsive to short-range fluctuations. One way to cope with short-range fluctuations, as well as long-range trends, is the use of temporary, non-tenure-track positions. The question of an appropriate fraction of non-tenure-track positions must be addressed.

Finally, any system of allocation developed in this period of underfunding should be applicable when the Institute's continuing efforts to achieve adequate state funding are realized.

3. FACULTY DEVELOPMENT

"The college expects the individual faculty member to continue developing his teaching competence by active participation in scholarly and professional activities. The faculty member should select his non-instructional activities to make a maximum contribution toward his professional development and toward the development of the College."

This is current policy on faculty development adopted in 1964 and stated in the Staff Handbook. It emphasizes the individual's responsibility for renewal. In the development of the policy as shown in the following excerpts from the Handbook, the Institute serves as a facilitator:

"Appropriate...activities include research..., publication, presentation of papers..., advanced graduate and post-doctoral study, consulting... and participation in professional activities. Schedules are arranged...so that time is available for these activities."

The "college...urges faculty... to attend as many meetings of professional and learned societies as possible. Whenever possible, all or part of expenses to attend these meetings is paid if a staff member is a member of a panel, presenting a paper, or is an active officer of the society."

There are several sources of funds within the College to support scholarly and professional activities of the teaching staff. Support for the following activities is specifically mentioned: Graduate study, research publication assistance, summer conferences and institute and professional meetings.

"The chairman should consider the requests of faculty members for load reductions...Such reductions may be made to prepare new courses, to develop new laboratories, to conduct research..."

A member of the faculty "may be awarded a sabbatical leave for an academic year at half pay or for a semester with full pay..."

This policy has been implemented in a number of ways. Almost without exception, teaching schedules have been arranged so as to allow the individual to have one weekday without classes. Individual faculty office and laboratory research space have been greatly improved in many departments. Funds have generally been budgeted for attendance at meetings and conferences. Though teaching loads have been high, load reductions have been permitted to develop new courses, laboratories, and curricula. The Foundation at NJIT has also supported released time for faculty research.

Seminars for teaching assistants and new teachers were held during the sixties which was the period of highest growth of the faculty. This program was strongly supported by the then newly created Research Foundation but was dropped in the seventies as the Foundation's mission changed and it became evident that the period of numerical growth of teachers was ending.

For the purposes then of intermediate and long-range planning, it is assumed that the following conditions will prevail:

1. The present condition of a scarcity of material resources will continue.
2. There will be relatively little movement of faculty into or out of the Institute.
3. The faculty will be called on to meet new changes in student body and in needs in the technology market place.

In the following paragraphs, a plan for responding to faculty development needs with the above conditions will be outlined. To begin with, what more can the Institute do? Basically the Institute must provide the environment to reinforce individual motivation. This can be done in a number of ways but the underlying shared values between the faculty and the administration are most important. With this mutual understanding the administration needs to be consistent in first providing continual encouragement by recognizing accomplishments and then in its level of budget support for this activity.

The overall program will address the central issue of faculty renewal. For without renewal, teaching loses vitality resulting in significant losses in academic program quality. Various opportunities will be provided to get the faculty to be personally involved in renewal. These opportunities will include sabbatical leaves, industry involvements, Institute research and development projects, in-house planned workshops, and seminars in new techniques and technology of teaching and learning.

The program will be tailored to educational needs and objectives on three levels: Institute, department, and individual. These needs and objectives will be discussed and be well-articulated before proposals are made. Proposals should respond to the following three options or areas of major concern:

1. Maintaining currency in a present viable field or subject of specialized interest. This may be done in a number of ways beginning with assisted self-study and including arrangements with other educational institutions, with federal agencies and with industry.

2. Going into new fields. This may be associated with new subject areas or new teaching techniques or may be the result of new interests on the part of the individual. The Institute is concerned with the exploration of intellectual mobility. Arrangements such as joint appointments is one suggested approach.

3. Upgrading teaching effectiveness. Faculty members will be encouraged to use instruments that measure teaching effectiveness with the major objective of providing information that will be diagnostic in character. Experiments using new but proven methodologies and techniques will be supported. As previously mentioned, the Institute's educational program needs to be responsive to the learning styles of its student body. It will be necessary to show how the effectiveness of new teaching formats and methods will be measured and to carry out these measurements.

Because of the degree of effort normally required to bring about change, definite time and resource commitments from all parties concerned need to be made from the beginning. To do otherwise would seriously jeopardize the success of any effort. Although precedents have been established, former beneficial but less attractive arrangements will have to be made more attractive. As examples, the one-year sabbatical and exchanges with industry need to be used to a greater extent.

Another aspect that requires more recognition is the purpose that summative evaluation serves for program effectiveness. From the beginning an evaluation method needs to be built into the program and subsequently into each proposal. The primary purpose of this method, will be to enhance the growth of the individual through self-evaluation.

To address the condition of scarce resources as well as good planning principles the departments need to give a high priority to this actitity and to integrate it with all of the other department/faculty concerns. This suggests a department standing committee that will set up procedures, review proposals, make recommendations, receive reports, etc. Criteria based on needs and expected productivity will have to be well articulated and generally accepted.

The success of this program will be tied to developing a system that is responsive to a large majority of individual needs, that is well understood and that can be used with few bureaucratic obstacles.

4. PROMOTION AND TENURE

In addition to its support of a program of faculty development, the Institute presently uses a system of promotion, tenure, and salary increase to provide recognition, encouragement, and reward to the faculty and to ensure faculty productivity and responsibility.

Under the present system each Departmental Committee on Promotions and Tenure consists of the department chairman and the tenured full professors of the department; the department chairman acts as chairman of this committee. The committee reviews, annually, the records of all persons in the department who have the minimum requirements for promotion and tenure. Recommendations are made regarding promotion, tenure, and exceptions to normal salary increments (including merit increments and denial of increments), by each departmental committee to the Institute Committee on Promotions and Tenure.

Appointed by the President, the Institute Committee includes tenured full professors, exclusive of department chairmen, with the terms of the members staggered so that no person serves more than three years in succession. Under present regulations, the number of such tenured full professors is not specified, but custom has established this number in recent years as three or four. The remainder of the committee, usually an equal number, is made up of members of the Institute administration.

Proposals by the departmental committees are evaluated by the Institute committee, which balances the recommendations of the various departments by considering the overall needs and objectives of the Institute. In the event of a difference of opinion on recommendations between the Institute committee and any particular departmental committee, consultations and exchange of information take place between them. If a difference in judgment still exists, both recommendations are sent to the President.

Any member of the faculty may consult with his department chairman regarding his promotion, tenure, or salary. Any member of the faculty has the right to appeal to the Institute Committee on Promotions and Tenure, and also the right of appeal to the President.

Some of the results attained by the present promotion and tenure system have caused the question to be raised "How well is the present system working?" Many younger faculty feel uncomfortable with a promotion and tenure system in which they have no input; it represents a burden to be borne which is all the more repressive because they have no voice in its methods, procedures, and application. The present system has undoubtedly led to a condition in which some departments are excessively tenured and prospects for advancement by younger, ambitious faculty members are dim.

Some of our highly-qualified and capable younger faculty members feel discouraged by a system in which there is so little prospect of reward for their efforts. In addition, there is some indication of complacency on the part of some senior faculty members, leading to a lack of participation by older faculty in research and other scholarly and stimulating activities.

Recognizing that deficiences and inequities do exist in our present system, all departments are presently engaged in a close examination of present promotion and tenure procedures. It is expected that this examination will result in recommendations for changes which will give us a more just and fair system of promotion and tenure.

An important aim of a just and fair system of promotion and tenure is faculty accountability in the fulfillment of obligations and the achievement of objectives; yet, this same system must foster an atmosphere of colleagueship and collegiality rather than of competition. Universities are not profit-seeking institutions, and the motivation of a faculty member is not generally the same as that of a corporation employee. In a successful faculty group there is a strange mixture of criticism and collaboration -- each member has an obligation to accept the barbs of his colleagues, but he can also expect to receive their support and plaudits, when these are needed or deserved. A good system of promotion and tenure makes reward accessible without injury to the distinctive contemplative character of academic work.

In judging faculty performance, the system of promotion and tenure must recognize a number of legitimate areas of faculty activity:

Undergraduate teaching. This includes all the classroom, laboratory, studio, library, and office work (including advisement of students) associated with our undergraduate programs. Most of our faculty are heavily engaged in this area; it is, and will remain for some time, the most important faculty responsibility.

Research and graduate studies. This includes graduate teaching, individual faculty research, research in collaboration with graduate students and other faculty, research in collaboration with other professionals outside the Institute, writing in professional journals, presentation of papers, seminars and state-of-the-art exchanges with professionals at other institutions, dissertation and thesis supervision, and graduate-student advisement. Many of our faculty are active in this area; it represents an important way for the Institute to increase its visibility and stature in the intellectual and scientific community.

Public service. Since NJIT is a public-supported institution, we have a natural, and welcome, obligation to make the talents of our faculty available, especially to the State of New Jersey and to the City of Newark. Many of our societal problems will be solved only by the application of scientific and technological methods. Work in this area is certainly a legitimate faculty activity.

Institute service. In the day-to-day, term-to-term, year-to-year, and long-term operation of the Institute and its departments, there are many processes which involve the academic function of the Institute and are of direct concern to the faculty. Included here are Institute and department committees, faculty committees, administrative work at various levels, and representing the Institute at public and non-professional meetings.

Other professional activities. Members of the faculty are encouraged to be active in the affairs of professional societies and organizations, expecially committee work at regional, national, and international levels. This area also includes such activities as writing textbooks, securing patents, and editorial and review work for publishers.

Drastic changes in the present Institute system of promotion and tenure are not needed, but a more effective system will evolve with the modifications listed below:

Communication. The system must allow more open and more frequent communication between Institute and departmental committees, it must encourage communication betweeen different departmental committees, and it must provide channels for input from all members of the faculty.

Review. The system must be reviewed on a continual basis, with inputs for this review process coming freely from all faculty members. Every member of the faculty must be aware of the structure of the system, and, through his departmental committee, make known his criticisms and suggestions.

Areas of Activity. Areas of faculty activity listed above must be more fully defined by individual departments; participation in this definition process must be by all members of the department faculty. Every major area important to a department's successful operation must be considered in determining an individual's contributions. The work of the patient, painstaking teacher who guides undergraduate students through fundamental courses is neither more nor less worthy than that of his colleague who is a meticulous experimenter working alone in research; the tedious, thankless, and often distasteful chores (in neither instruction nor research) performed by a department member are as important to the department's operation as the planning and delivery by another department member of an up-to-date series of graduate lectures. All roads lead to Rome, but there are many roads.

Measurement of Performance. Only imperfect yardsticks are presently used to measure faculty performance in the various areas of activity. In establishing criteria for promotion and tenure the full faculty of a department must be involved, and extensive use must be made of the communication channels mentioned above; in this way, all members of the faculty will help to generate measures of performance. This will lead to a promotion and tenure system which has not been imposed by higher authority, but is, indeed, a product of the faculty.

Accountability. A plan of personal progress and advancement will be developed by each member of the faculty, in concurrence with his department. Each such individual plan will be flexible enough to permit changes in the faculty member's interests, changes in departmental needs, and changes in technology. The performance of each faculty member will be judged against expectations expressed in the plan. The promotion and tenure status of each faculty member must be fully understood, at all times, by both the individual and his deparmental committee; performance evaluation will be made on a regular basis, with the active participation of the individual involved. It is the responsibility of the departmental committee to make full and complete disclosure to the faculty member of his evaluation. The effects of changes in departmental priorities and changes in Institute priorities on an individual's promotion and tenure status must be fully understood.

Merit Reward. Reward for exceptional performance should be upheld, but not at the expense of harm to faculty members whose progress is steady but not spectacular. It must be remembered that financial reward is often not the most important consideration in a faculty member's effort - the triumph of solving a knotty problem, requiring the utmost of one's intellect and ingenuity, is often sufficient reward; the earned respect of one's peers is often more important than an increase in salary; nonetheless, the latter should be given after the former has been won.

5. FACULTY GOVERNANCE

Institute Governance. Although the concept of faculty governance is difficult to define, it does have a certain operational meaning at the New Jersey Institute of Technology where authority and decision making have become increasingly shared in the last fifteen years among various segments of the Institute community. Prior to that, authority had been largely centralized in the offices of the President, the central administration, and departmental chairmen. The President appointed chairmen, Institute committees, and the like, sometimes in consultation with other members of the community, sometimes without it. The President served at the pleasure of the Board of Trustees, as he still does, and was accountable to it. Department chairmen had the authority to make recommendations to the President and the Board to hire, fire, promote, grant tenure, and to withhold or to recommend financial increments.

In the last decade, however, authority and responsibility have become more diffuse. Department chairmen, for example, are now selected by a more open process. Departmental search committees, whose members are elected by their departments, screen and interview candidates and recommend to the President and the Board a list of three nominees for their final selection. Furthermore, the authority to make recommendations to the President and the Board to hire, fire, promote, etc., is now shared by the members of the departmental Promotions and Tenure committees, composed of all the tenured full professors in the department.

Standing committees of the Institute are now selected by an Institute-wide Committee on Committees composed largely of faculty members. While the President reserves the right to approve the choices, he no longer initiates them. Simiarly, an Institute Promotions and Tenure Committee, composed of three administrators and four faculty members, acts on departmental recommendations before they are turned over to the President and the Board for final approval or disapproval.

Additionally, an important step toward increased faculty governance was taken when the Institute established a Faculty Council with a charge to deliberate, investigate, communicate, and recommend legislation to the full faculty for its approval. The Council, composed of elected members of each department with an elected revolving Chairman and Vice-Chairman, meets each week to discuss various governance issues that come before it. From time to time, it recommends legislation to the full faculty, conducts faculty hearings, and introduces the legislation at faculty meetings for the full faculty to act upon. The Chairman and the Vice-Chairman have direct access to the President and other administrative officers when matters of joint concern must be discussed.

Departmental chairmen, who are inelegible to serve on the Faculty Council, are represented through two governing bodies which meet frequently: the Academic Affairs Committee, presided over by the Vice-President for Academic Affairs, and the Executive Committee, presided over by the President. While the responsibilities of the different bodies are loose and sometimes undefined, it has been felt that both groups are necessary to provide the broadest participation in the affairs of the Institute. These bodies work cooperatively with the Faculty Council on important matters, for while it is apparent that a somewhat autonomous faculty and administration is desirable, it is also apparent that no one segment of the Institute is entirely independent. Therefore, in the past year particularly, various joint committees have been formed between the Faculty Council, on the one hand, and the Academic Affairs and the Executive Committees, on the other, to study particular problems that affect most members of the Institute, problems such as criteria for promotions and tenure (especially important in a tight market), criteria for sabbaticals, and many others. The hope is that any recommendations emanating from these joint bodies will have the support and approval of both faculty and administration.

Similar cooperative efforts exist at other levels of the Institute as well. For example, on search committees formed to fill important administrative posts, elected faculty members and appointed administrative officers serve jointly to provide the widest experience to select the best person for a given position.

In a like manner, student representation in Institute affairs and governance has increased over the last ten years. Students, in addition to having their own Senate, now serve on a number of important Institute standing committees such as the Professional Conduct Committee, where the interests of students are directly involved. Similarly, this year there are student representatives on the Presidential Search Committee and on the Dean of Student Services Search Committee. It is hoped that student participation in the affairs of the Institute will increase in the future.

It is more difficult to differentiate strictly administrative concerns from the particular concerns of the faculty than it is to articulate the mechanism by which each functions. However, certain broad areas of responsibility can be sketched.

It is generally held that the faculty ought to advise and consent on matters relating to academic programs. Major curriculum changes are best made by a vote of the full faculty. Although each department knows its individual needs and goals better than any other, it has long been felt that the best interests of the whole Institute reside in the collective, disinterested voice of the whole body which can serve as a corrective to the partial and incomplete view of an individual department or program. Similarly, the administration may advise on such matters, even lead, but the final approval should lie with the faculty. Also, the faculty feels that it ought to exert a powerful role in the composition of important search and other Institute committees, that it knows the members of its own body better than other groups in the Institute know them, and that as the administration decides who it wishes to represent it, so the faculty has a similar right to decide on its representation.

Finally, the faculty feels it ought to have an important voice in other academic matters to which its talents are peculiarly suited even when the administration of these functions is in other hands: e.g., admissions policy, criteria for academic standing, professional conduct, etc.

The administration has certain prerogatives which, if loosely defined, are generally agreed upon. The President, responsible ultimately to the Board of Trustees, has the power to make important financial decisions, to decide on the allocation of increasingly tight budgets. For example, he, together with his central administration, has important decisions to make regarding budget allocations among faculty lines, laboratory equipment, library acquisitions, etc. Moreover, in an era of little or no expansion of existing faculty, the administration must decide on an equitable balance between tenure and non-tenure lines, between professorial and non-professorial lines, and in the distribution of ranks. The President and the administration must often adjudicate the competing claims of individual departments, must keep abreast of programs and trends in other similar educational institutions, and be able to lead and guide a faculty to work in the best interests of the Institute which, coincidentally, ought to be in its own best interests.

It appears, however, that if either group isolates itself too much from the concerns of the other, the Institute will suffer. An administration ideally ought to lead by persuasion not dominate by coercion. This it can do only if it opens up discussion as much as possible to interested and concerned faculty members. On the other side, the faculty, while maintaining its integrity, ought to attempt to minimize confrontation with the administration by attempting to work with it as cooperatively as possible.

Proposed Changes

While we acknowledge that the Institute has addressed many of the problems before it and solved some of them, problems and confusions still exist, as they do at all institutions. We have listed below some of the problems and confusions that we have isolated at NJIT.

Specific rights and obligations of the faculty and administration are delineated in the Staff Handbook, which has evolved over a number of years and began when the Institute was Newark College of Engineering. The Handbook, although useful, is in some areas out-of-date and in others too loosely or vaguely worded to be helpful in resolving specific disputes. It needs an updating and some revision. A committee will be formed for this purpose.

Institute personnel think that a certain ambiguity exists concerning the very procedures which govern legislative change. After a piece of legislation is approved by the faculty, approved by the President, and approved by the Board of Trustees, it, theoretically, goes into the Staff Handbook as new policy. Most of the time the procedure works as it has been outlined. Sometimes, however, it does not. There ought to be greater clarification of procedures for policy change.

Ambiguity is also present regarding the kinds of issues that require approval by the full faculty. For example, it is not certain whether or not administrative restructuring of academic units requires faculty approval.

Because of these and other ambiguities, decisions are sometimes made on an ad hoc basis which may work very well for the moment but provide no consistent procedure which, if it were available, would be swifter and often less frustrating to all.

The relationship of Institute standing committees to overall policy making has also been a source of occasional frustration. While the individual Institute committees often do their jobs well, they are often confused as to their purpose and their responsibilities. If they wish to recommend policy changes as a result of their deliberations, they are often confused as to the route to follow. Also, some members of the committees are frustrated when they hear of the duplication of their labors by other committees of the Institute.

The last concern is not easy to articulate or to resolve because it concerns the very delicate balance that exists between governance, on the one hand, and collective bargaining, on the other. The Institute has a Professional Staff Association which bargains with the Administration for such things as salaries and working conditions. In addition, it handles grievances brought by members of the bargaining unit, which includes all faculty and some administrative personnel. Other issues such as curriculum proposals, admissions requirements, professional conduct, the composition of Institute committees, etc., are generally considered to be governance issues that come before the full faculty to decide, after they have come before the Faculty Council and other governance bodies. The demarcation of responsibilities among the various segments of the community is, however, not always clear and fixed.

Many issues that have traditionally been considered governance issues have, of late, found their way to the bargaining table to be made part of legally binding contracts. A reason for this is that issues that seem purely academic often impinge on questions of working conditions. For example, it is not clear whether the issue of class size, the ratio of students to instructors, is a purely academic one to be argued in the academic area on purely pedagogic grounds or one that directly affects the working conditions of an individual faculty member.

It is still too early to assess the effect of the Professional Staff Association on the whole question of faculty governance, but some confusions have arisen and we expect more to arise in the future. There are, however, conceptual contradictions that are obvious. Collective bargaining, by its very nature, implies an adversary relationship. When two parties meet across a bargaining table they obviously acknowledge certain conflicting claims on each other. Faculty governance, on the other hand, ideally implies cooperation. Conflicts may and often do arise but they are not inherent in the system.

Since the Institute is committed to a strong system of faculty governance, as well as to the protection of the rights of each of its faculty and staff, it wishes to strengthen governance and, at the same time, improve the quality of education it offers which it hopes will benefit not only the student but individual faculty members as well.

A joint faculty and administrative committee has been proposed to begin to address some of the issues alluded to in this report. It intends to examine governance at all levels of the Institute, to isolate the strengths and weaknesses of our present system, and to recommend changes if it decides that changes are necessary. Such a study will not be easy or short, but if pursued openly, with participation by a large segment of the community, ought to yield positive results for years to come.

Departmental Governance

Obviously, no effective governance can operate on the Institute level if it is ignored on other levels of the Institute. It is for that reason that effective departmental governance must be addressed as well. The problems of departmental governance are at once subtler and more complex than those of the Institute. In a sense, Institute governance can serve as a paradigm for departmental governance. As Institute-wide problems ought to have full and open discussion, so too must departmental members participate as fully as possible in departmental decisions concerning a wide variety of issues.

Although the policies of departmental governance vary from department to department, the following represent what, in our view, constitute the chief concerns of the department as a whole:

(1) The role of the department chairman. The work of the department chairman at NJIT has continued to change over the years, and it is obviously difficult in a small amount of space to delineate all his responsibilities. Ideally, a chairman ought to be at one and the same time a strong effective leader and a person with obvious democratic inclinations. He is first among intellectual equals rather than an employer directing the operation of subordinates. Furthermore, he has a dual responsibility to represent his department to the administration, and the administration to the department. If he loses sight of either role, his department will suffer and so will the Institute.

(2) The mission of the department. As the Institute has a mission, so too does each department. Degree granting departments have a particular responsibility to insure that they are graduating well educated and well trained professionals to enter specific careers. Non-degree granting departments have a responsibility to assist the degree granting departments while at the same time maintaining the integrity of their discrete disciplines. Open discussions ought to be held to assess present and future needs of a department with regard to how best to fulfill its mission.

(3) Curriculum matters. The curriculum ought to be decided on by the members of the department after free and open discussion of all the members. Since departments are composed of individuals with special knowledge and skills, the contribution of each to the joint body is especially important, and suggestions of each ought to be heard by everyone. It is not enough for a chairman to confer privately with different members of the department before reaching a decision.

(4) Allocation of travel and faculty development funds. The members of the department ought freely to discuss and decide upon criteria for the allocation and sharing of increasingly scarce funds for the department. A chairman ought not to have the power unilaterally to decide on funding for a project that he feels is in the best interests of the department. As the Institute needs and missions are changing, so too are the needs and missions of departments undergoing changes. Incentives for better teaching, research, and general contributions to the Institute must be shared as equitably as possible with as many members of the department as is feasible.

(5) Leadership roles of individuals within a department. Additional responsibility ought to be given to departmental committees and membership on such committees ought to be divided among as large a segment of the department as possible. All members of the department ought to share the responsibility for the department's business. Committee chairmen ought to be elected by the members of the committee rather than be appointed by the chairman. Leadership of individual members of a department ought generally to be encouraged.

Conclusions

Some changes in governance are already under discussion and more will follow in the near future. Obviously, the answers are not easy. In an era in which faculties will remain somewhat stable, promotions and tenure will be increasingly more difficult to obtain. It is, therefore, all the more necessary to provide incentives at departmental and other levels of the Institute for faculties to work together to find solutions which, if not absolutely acceptable to all, are, at least, not onerous to all. Salaries and promotions, while important to faculty members as well as to others, are not the sole motivations for working to improve the Institute. Frustrations are lessened too if faculty members feel that they can speak freely and that their contributions, if valid, will be respected and sometimes acted upon.

Some of the proposals in this chapter, if accepted, will require modest annual funding. In some cases external grants can be sought with good chances of success; in other cases Institute funding will be required to bring these plans to fruition.

6. FACULTY STATISTICS

In the planning for faculty development important factors to be considered are distribution of faculty by rank, tenure, highest earned degree and age. These data are presented in Tables 9.1 through 9.4, based on the 270 full-time instructional faculty in the Fall semester of the 1977-1978 academic year.

It will be noted that NJIT has a somewhat smaller percentage of full-time instructing staff (60%) in the upper ranks compared to all U.S. public universities (66%). Within the ranks of assistant and associate professor, NJIT's tenured percentage equals those of all U.S. public universities. For professors, NJIT's percentage of tenured staff is 97 vs 93 for all U.S. public universities.

Sixty-three percent of the full-time instructional staff have earned doctorates in the relevant discipline, and all but two per cent have at least the relevant Master's degree. For architects the Master's is considered the terminal degree. If we assume that for other NJIT staff the terminal degree is the doctorate, 69 per cent of NJIT full-time instructional staff have earned the appropriate terminal degree.

For many reasons, one of which was alluded to in the preceding sentence, faculty development must be planned based on departmental needs. The data of Tables 9.1 through 9.3 are broken down by academic department in Tables A9.1 and A9.2 of the Appendix. The former table includes also the numbers of female faculty in each department.

TABLE 9.1 NJIT FACULTY DISTRIBUTION BY RANK: FALL 1977

Rank	NJIT Number	NJIT Percentage		All U.S. Public Univ, Percentage*	
Professor	70	26	60	35	66
Assoc. Prof.	92	34		31	
Asst. Prof.	86	32	40	24	34
Inst. & Lect.	22	8		10	
TOTAL, FULL-TIME	270	100		100	
Adjunct & Grad Asst.**	59				

TABLE 9.2 NJIT FULL-TIME TENURED FACULTY: FALL 1977

Rank	NJIT Number	NJIT Percentage	All U.S. Public Univ, Percentage*
Professor	68	97	93
Assoc. Prof.	76	83	83
Asst. Prof.	17	20	20
Inst. & Lect.	0	0	8
TOTAL, Tenured	161	60	

*Source: AAUP Bulletin of Aug. 1977 (Data for 1976-1977)

**Part-time FTE instructional positions.

Note: Not included are 9 administrators holding academic rank.

TABLE 9.3 NJIT FULL-TIME FACULTY DISTRIBUTION BY HIGHEST EARNED DEGREE: FALL 1977

HIGHEST EARNED DEGREE	NUMBER	PERCENTAGE
Doctorate	171	63
Master's	93	34
Bachelor's	6	2
TOTAL	270	100

TABLE 9.4 NJIT FULL-TIME FACULTY AGE DISTRIBUTION: OCTOBER 1977

RANK	25-34	35-44	45-54	55-65	Over 65
Professor	0	10	30	31	0
Assoc. Prof.	4	34	32	21	1
Asst. Prof.	26	41	12	6	0
Inst. & Lect.	9	3	3	6	0
TOTAL	39	88	77	64	1
Percentage	14	33	29	24	0

Source: N.J. HEGIS No. 40277

CHAPTER X SUPPORTING SERVICES

The Institute's supporting services to be discussed in this chapter include library, instructional media, central computing, and student services including counseling, educational and recreational, and services of an administrative nature.

1. ROBERT W. VAN HOUTEN LIBRARY

The library's primary mission is to support the programs of the Institute, which it does by providing necessary services to faculty members and researchers working on the campus. The library is also available to local commercial and industrial firms as well as to the general public.

The principal activities of the library are shown in Table 10.1 which also indicates the approximate staff assignment to each task in 1977[1].

TABLE 10.1 PERSONNEL ASSIGNED TO EACH LIBRARY FUNCTION

Activity	Professional Staff	Non-Professional Staff
Acquisitions	1	1.5
Cataloging	2	2.5
Reference	1	0.5
Instructional	*	*
Circulation	1	2.0
Collection maintenance	*	*
Inter-library loans	*	*
Periodical services	0	2
Arch. Inf. Center	1	1
Administration	1	1
Miscellaneous	0	0.5
Total	7	11

*Personnel needed for these duties are drawn from other departments.

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[1] A comparison of staffs of the NJIT library and those of the N.J. State Colleges is tabulated in Table A10.1 of the Appendix.

In the year 1976-77 the 18 FTE staff members served 302,476 people entering the main library turnstiles by circulating 48,358 books and periodicals, 26,423 slides and 1,335 inter-library loan items[2].

The Library's Role in the Future of the Institute.

The library, if it is to better serve the needs of the students and faculty, must strive to become a modern learning center where a variety of print and non-print informational materials are readily available on film, videotape, audio cassette and computer terminal as well as in the more traditional books and periodicals.

Instruction in the use of library resources should be made available so that students acquire the tools of research early in their career. A computer-aided bibliographical service should be established at NJIT both to benefit our own researchers and to sustain the reputation of the Institute as a center for technological scholarship.

Since at present the library is able to supply assistance to industrial firms and the general public only in a very rudimentary fashion, more resources should be devoted to this community service. Although microfilming may help to solve space problems, books remain the most important asset of a library. Therefore, recommendations for replacing portions of the collection with microforms are limited to:

a) back issues of periodicals

b) research reports

The following goals have in consequence been established for this master plan:

Goal 1

Additional Library personnel and additional space will be required in the immediate future. Some alternatives which may alleviate the problem but will not eliminate it completely are:

(a) Automation, including the use of the technical processing capacity of the computer terminal link with the Ohio College Library Center.

(b) Increase in use of microfilm and microfiche.
(c) Increased cooperation among the neighboring college libraries and the Newark Public Library.

Goal 2

The Library will offer a new computer assisted service in bibliographic searching initially comprising a single terminal with a trained operator.

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[2] Statistics relative to library growth since 1960 are given in Table 2.13 and Figure 2.10. Library staff sizes for N.J. colleges are compared in Table A10.1 of the Appendix.

To Improve Present Services

At present, library services can be improved by additional staffing in:

1. Reference The reference desks in both the main library and in the Architectural Information Center should be staffed during all the hours that the library or the center is open. To obtain full coverage will require one additional FTE professional person.
2. Instruction Instructors should be encouraged to arrange for their students to receive instruction in the use of the library. An additional 1/2 FTE professional person would be sufficient for this task.
3. Circulation The library could provide better services if overdue materials needed by other students and faculty members, were promptly recalled. A minimum of 1 additional FTE non-professional staff is needed for this service unless the circulation procedures are automated and a cost-effective system allows the present staff to be utilized to better advantage.
4. Stacks Books are often not available because, having been improperly replaced on the shelves, they cannot be located. An additional 1/2 FTE non-professional staff member could put the collection in order and maintain it.
5. Inter-library loans An arrangement which makes available to the faculty and students of NJIT the resources of many other libraries, the Inter-library Loan Service, would be invaluable if it were more efficient. One additional FTE non-professional staff member would make it so.

The total staff requirements outlined above are an additional 1.5 FTE professional and 2.5 non-professional staff. Not included is the cost of extending library hours, should that be necessary, when NJIT's first dormitory is opened.

Space Requirements

The present 29,500 square feet will be inadequate to house the growing collection. Unfortunately, the construction of the Library/Humanities building is such that physical expansion on either of the library's two floors is very difficult. Microforms and compact shelving for non-public storage areas, will minimize additional space requirements. Costs will depend on the number of volumes of periodicals replaced by microforms, which in turn will affect the number of reader-printers needed. Space and binding charges will be saved and the possibility of damage to the collection will be lessened. The cost of compact shelving will depend on the size of the area that is devoted to this type of storage.

Recommendations For New Library Services

Two much-discussed projects which provide better library services, and their costs, are listed below.

1. Computer-aided bibliographical searching. This service will enable the library to obtain lists of bibliographical references in specific subject areas. Such a service will undoubtedly increase the demand for materials, including books, periodicals, conference papers and government research reports, both purchased and borrowed.

Cost:	Equipment - computer terminal:	$2,000
	Space - 30 square feet	
	Personnel - Information Specialist:	1/2 time
	Clerk-typist:	1/2 time
	Training and introductory costs:	$3,000

2. Automation of slide-collection index. This will allow the coordination of index items and, therefore, make possible the location of slides that escape notice in a manual system. Also, it is expected that the data will be placed in an on-line system so that other schools, colleges and architectural firms can have access to the information through their own computer terminals.

Cost of a two-year project:

Programming - $10,000
Keypunching - 5,000
Personnel: - 1 Professional librarian
1 semi-professional librarian

2. INSTRUCTIONAL MEDIA CENTER

The purpose of the Instructional Media Center (IMC) is to serve as a source for all media and audio-visual (A-V) materials and equipment for the faculty, staff and students at NJIT. The IMC serves as consultant, coordinator, and producer for campus A-V materials and playback facilities. The IMC documents campus activities through media and makes these materials available to the college community and general public. In addition the IMC serves as an active laboratory for the instruction of faculty, staff and students in media, audio-visual and their related technologies.

The IMC also assists faculty in preparing presentations for scholarly conferences and publication. In addition it has contributed labor and equipment time to public service projects (e.g., Newark Museum, Newark Bicentennial Commission, etc.).

The IMC acts as a central purchasing, inventory, and distribution agent for all A-V equipment and materials on campus, and (through rental or loan) whatever special equipment may be needed for official Institute functions. The IMC maintains files on A-V materials available through rental and free loan, and upon request procures these materials for departments and individuals on campus for instructional use.

The tasks of the IMC in most cases are performed by the professional and student members of the center staff, but on request these personnel assist the faculty, staff and students.

The IMC is responsible for maintaining Audio Visual equipment on campus. This is presently done by the Coordinator of A-V activities with student assistance. When workload, lack of test equipment, or replacement parts make in-house repairs impossible, this equipment is serviced by outside repairmen.

The IMC is responsible for the establishment, maintenence, and support of the CAUSE Learning Centers to be located in individual academic departments. Support materials are produced at the IMC under the direction of the instructors involved.

Growth in IMC Services

The IMC was formally established in 1974 and staffed with a Coordinator of Audio Visual Activities, a media assistant, and three Work/Study students. Since that time the only addition to the personnel has been one student for ten hours a week. Present functions and capabilities are listed in Table A10.1.

The space allocation and budget for the IMC have grown little, In this same period, however, there has been increased demand for media services as reflected in the statistics of Table 10.2.

TABLE 10.2 GROWTH IN USE OF MEDIA SERVICES

	1974-75	1975-76	1976-77	1974-77 Increase
IMC Productions	190	225	343	80%
Self-Help Projects	377	455	617	63%
Equipment Use	404	977	1,655	309%
Special Events, Etc.		78	62	
Overall Transactions	971	2,435	2,677	276%

Tables A10.3 and A10.4 in the Appendix indicate that the expenditures for supplies and equipment of $5.60 per FTE student, and the number of personnel and hours/week allotted to NJIT's Instructional Media Center, are considerably below the mean for N.J. state colleges.

Instructional Media Goals

While media materials cannot and should not replace the personal relationship of student and teacher, they can increase the effectiveness of classroom teaching. To keep up to date with various new classroom techniques, a strong commitment is necessary to augment the facilities required for media development and to make these methodologies available to instructors.

The IMC must have sufficient physical space to grow. This space allotment must be coupled with sufficient utilities to meet our present and future needs, including increased electrical service, hot and cold running water, and increased air conditioning service.

The following goals have been established for the IMC:

Goal 1

Services of the Instructional Media Center will be expanded with additional personnel, space, and equipment. Continued cooperation with the library will make media-related activities more effective.

Goal 2

The Institute will take advantage of a matching grant to lay cables interconnecting its academic buildings and to install television monitors in classrooms and instructional laboratories.

Recommendations To Upgrade Present Services to Satisfactory Levels

1. Staff Increase staff as soon as possible to include: 1 technician, and 1 graphic artist/photographer. If, due to budgetary restraints, these positions must begin as part-time positions, long range plans must call for them eventually to become full-time.
2. Space Expand the IMC into space presently used for an A/V classroom, relocating the latter elsewhere on campus. This move will provide a 100 per cent increase for work and storage space for IMC staff over its present 1060 square feet.
3. Install an alarm system to limit losses by theft.
4. Install three additional 20AMP power circuits for safe operation of present equipment. Install sink in darkroom.
5. Replace wornout and stolen equipment ($5,800). Purchase new equipment required to achieve full potential use of equipment already on hand, and to update obsolescent A/V facilities ($10,700).

Recommended New Services and Capabilities

1. **Cabling** The Institute must match the $13,000 grant for the project which will install a coaxial cable between Institute buildings and provide permanent video playback capabilities in: Library, School of Architecture (Information Center, Gallery & Studio), CIS Department and associated classrooms, EE and ChE laboratories, classrooms in Humanities building, Architecture Lecture Hall, and 2 lecture halls in Tiernan Hall.

2. In order to make full use of the equipment above, it is also recommended that the Institute establish a broader video production capacity. The intention is in no way to duplicate the extensive facilities at neighboring institutions, but to meet the specific needs of NJIT for quality portable video recording so that, for example, lab experiments can be adequately recorded and the tape edited into an effective teaching aid ($22,000).

3. CENTRALIZED COMPUTING FACILITIES

Modern computing facilities are a necessary adjunct to both the academic and administrative programs of any modern educational institution; but it is not overemphasis to state that an engineering school or a technological university could not continue to exist without adequate computer hardware and software.

The Division of Computer Services presently operates, for instruction, research and administrative users, a 7-year-old UNIVAC Model 70/3 digital computer having a virtual memory operating system for both batch and interactive users. This on-premises system is supplemented by a separate remote-job-entry batch terminal tied by high-speed communications link to an IBM Model 370/168 computer in Piscataway, New Jersey, operated by the New Jersey Educational Computer Network, Inc. (NJECN), of which NJIT is a corporate member.

The Institute has recently established, on an experimental basis, a centralized computer graphics laboratory, operating as an Institute-wide facility in temporary quarters.

Prior Planning

Progress in the state-of-the-art in computer hardware, added to NJIT's increasing needs for the computer in course work, research, and administrative computing, indicated as early as 1975 that the existing facilites were becoming inadequate and obsolete. Following a local study of the options for modernization and growth, early in 1976 a tri-partite planning effort was begun among NJIT, NJECN, and the N.J. Department of Higher Education (DHE). From these efforts there emerged three planning documents* which developed projections of NJIT's computing requirements, a five-year plan for developing a system for delivering services to meet these requirements, and a plan for integrating the facilities at NJIT with those of NJECN and its other members, particularly those with similar needs in the northern half of the State.

In brief, the computer plan proposes:

- The acquisition of a major computer, with emphasis on interactive use, to be located at NJIT
- that batch computing would be shared by the NJIT computer and the IBM Model 168 at Piscataway
- that the new facility, for which a "Request for Proposal" has been prepared for interested vendors, be configured to NJIT's unique requirements and in addition will be expandable to serve some of the needs of other NJECN users in northern New Jersey
- that the new computer be integrated into NJECN as a northern node of the network. The needs of a particular user (including NJIT) will be served by the northern node and other components of the statewide system.
- that the northern node will be owned by NJECN and operated by NJIT personnel. Fiscal supervision and the planning and coordination of all network facilities, including the northern node, will be responsibilities of NJECN.

Goal 1

NJIT's central digital computer facilities will be moved to larger quarters and integrated into the New Jersey Educational Network as the northern node of the statewide system.

Goal 2

The Institutes's administrative functions, in a step-by-step manner, will be transferred to a data-base as an aid in day-to-day operations which will facilitate the planning process of the Institute.

Goal 3

The experimental facility for interactive computer graphics will be expanded to comprise an Institute-wide laboratory for instruction and experimentation.

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* 1 "Digital Computer Usage and Requirements for NJIT", by A.J. LaSalle G.J. Moshos and F.A. Russell, NJIT, June 1976.

2 "Five Year Computer Plan for NJIT", by G.J. Moshos and F.A. Russell, NJIT, Aug. 1976 (Rev. 9/76)

3 "Proposal for the Definition of a Northern Node of NJECN" by Joseph Denk, NJECN, June 24, 1977.

Full attainment of these three goals within the next three years will affect the Institute's operations on three fronts:

Academic - The use of computers in the design process -- more and more in the interactive mode -- is an essential ingredient in modern technology and is increasingly evidenced in NJIT's curricula. Further, an ever larger library of programs is required. (It has been estimated that \$2 x 10^9 worth of scientific programs is available today.) To store and use the larger of these programs requires access to a large computer.

Interactive graphics is an increasingly important academic computing area which has numerous applications in engineering design and architecture.

Research - All that was said above with respect to academic computing applies as well to research. In addition minicomputers providing specialized computing for dedicated applications can sometimes be cost effective. NJIT's computer conferencing installation is an example.

Administrative - Implementation of the northern node together with the recent acquisition of System 2000 database management system will enable NJIT to proceed with its three-year plan for developing its administrative data processing operation.* In the first phase access will be via card decks in a manner similar to that employed presently. Data bases will be set up department by department and administrative users will become accustomed to the database. In the second phase data bases will be stored "on-line" and computer terminals in the administrative offices will be used to query the data bases. The final phase will be conversion from card decks to direct data entry from the terminals for updating the data bases.

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*The plan for implementing the database management system is shown in Figure A10.3 of the Appendix. Scheduled for completion during the summer of 1978, delays in a acquisition of the considerable resources required (computer capacity, software and programmers) has postponed implementation by at least one and one-half years.

TABLE 10.3 WORKLOAD PROJECTIONS (MRU-MILLIONS OF RESOURCES UNITS)

	FY'77	FY'78	FY'79	FY'80	FY'81	FY'82
Functional Distribution						
Interactive	12	15	30	35	42	49
Batch	30	40	44	52	54	56
Totals	42	55	47	87	96	105
System Distribution						
Local (N. Node)	38	41	56	7	78	85
Remote (Cent. ECN)	4	14	18	15	18	20
Totals	42	55	74	87	96	105

Table 10.3 indicates projected growth of NJIT use of computers for the NJIT - NJECN system. (It does not include graphics and dedicated minicomputer use which does not use the central resources.) The "resource units" used in the table are cost-related measures for the various hardware components of the computer system used in a given type of computing job. NJECN presently charges $8,000 per million resource units (MRU).

To these costs must be added the costs of NJIT support personnel, terminals, supplies, etc. and the expenses of the computer graphics laboratory. The resulting projected cost estimates are shown in Figure 10.1.

The large increase in computer resource use and cost as the new computer comes into operation is predictable from its interactive computing capability for academic, research and administrative (data-base) uses. Experience indicates that a smaller but substantial increase in batch mode computing will occur also because many of the new application programs created using interactive terminals will subsequently be used for production runs in the batch environment.

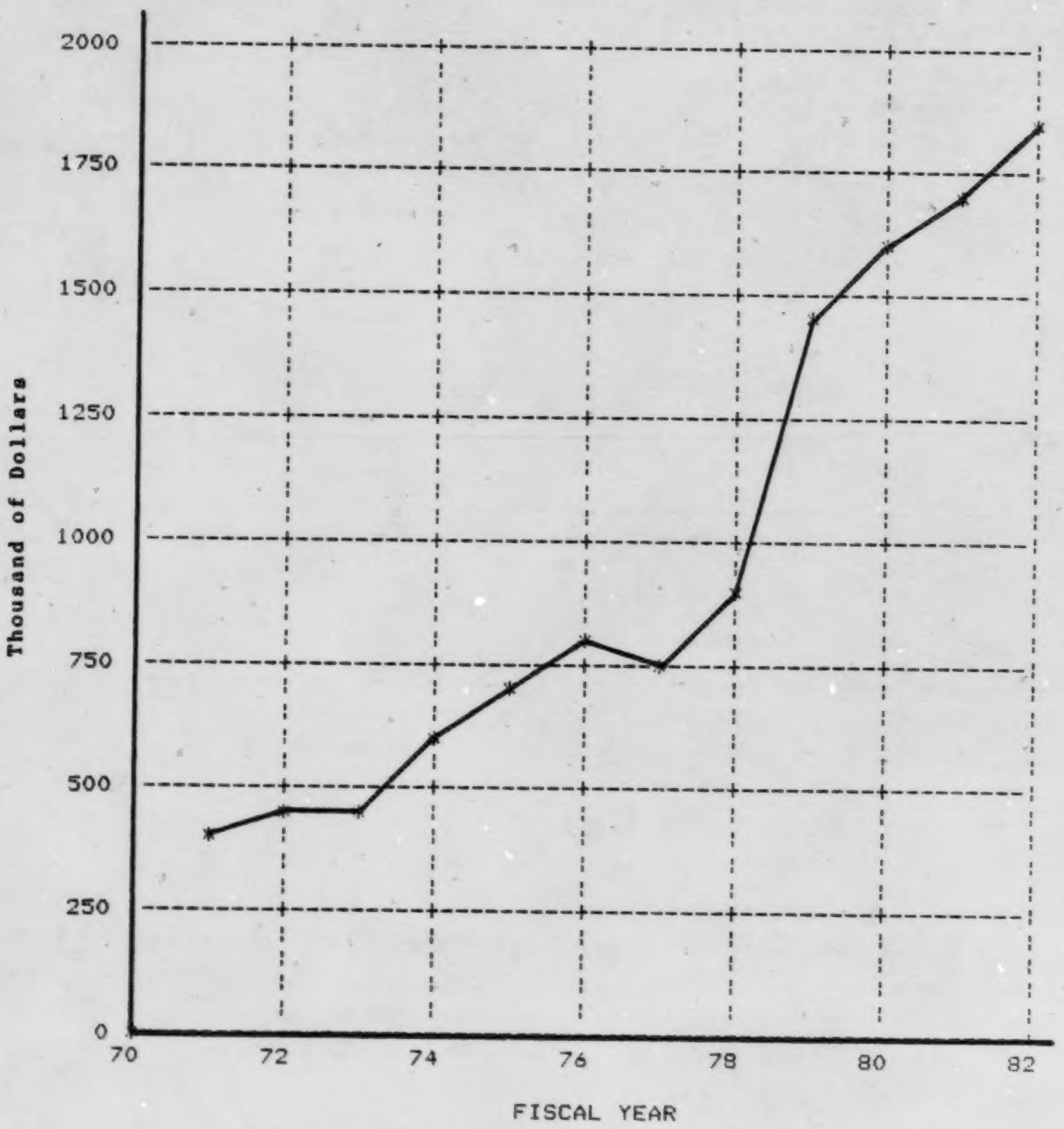
Computer Expansion Plan

The goal for computer expansion and integration with NJECN, to meet the objectives outlined above, requires a much larger area than presently occupied by the Computer Services Department. The 200-floor of Colton Hall has been selected for this purpose. It not only provides for an increase in area from 4080 square feet to 7100 square feet but provides:

- A contiguous area for all centralized computing functions other than remote terminals
- Consultant's offices, computer library, and student workspace near terminals and card punches

Figure 10.1

PAST AND PROJECTED COMPUTER EXPENSE



- Space for the computer graphics laboratory
- Space for two classroom - workrooms
- A location adjacent to the Department of Computer and Information Science.

Resource Requirements

To implement this plan requires an estimated $250,000 for rehabilitation of the 200-floor of Colton Hall, NJIT's oldest laboratory building. This site preparation includes air conditioning, installation of raised flooring for the computer room, electric power installation, etc. This work should be completed by January 1, 1979. It is not included in the figures below.

The table below indicates increases in expenditures over the FY1977 budget of approximately $750,000.

TABLE 10.4 COMPUTER SERVICES RESOURCE REQUIREMENTS
(Increase over 1976-77)

Fiscal Year		Salary	Non-Salary	Total
77-78	Configure new system	$416,100	$483,100	$ 899,200
78-79	Install new system	494,000	951,400	1,445,400
79-80	Complete conversion	598,000	978,000	1,576,000

The graph of Figure 10.1 indicates the total past and projected computer expense, including equipment for computer graphics. A planning schedule for the new system installation, together with a floor plan for the new quarters are given in the Appendix, Figures A10.1 and A10.2.

The Future of Academic Computing

In a field developing as rapidly as that of computing, revolutionary changes can be expected to occur. With the increased sophistication of pocket calculators and the forthcoming use of microprocessors for home computing it may well be that within ten years -- by the time the computer system now proposed has become obsolete -- the centralized computer may function principally as a library source of programs and databases. In the academic area, particularly in the education of undergraduates, each student may be able to do his own computing, given access to programs and data from the "library."

It is not too early to begin a study of the future of academic computing.

Goal 4

A long-range study will be made of the overall field of academic computing, including the mix of central computing, minicomputers, microprocessors and scientific pocket calculators.

This goal will be given as a charge to the faculty committee on academic computing.

4. STUDENT SERVICES

The Student Services Division of the Institute provides essential support services to all of its students. It is indeed difficult to specify all the ways in which the Division serves the diverse needs of the students in addition to interacting with faculty and administration to create a more attractive environment for students to develop themselves emotionally, culturally, and intellectually. As the Institute has changed from an engineering college to a modern technological Institute so, too, has the student body changed from a predominantly male, essentially homogeneous one, as the enrollment of women, minority and foreign students has steadily increased. These changing enrollment patterns necessitate changes in the Student Services Division, as well as in the rest of the college. Students at NJIT today, as across the country, need more remediation, closer attention from counselors, and greater variety of programs and activities. When the Institute opens its first dormitory in the fall of 1979, it is expected that the student body will change again, as we begin to attract students from geographic locations not heretofore served by the Institute. Just how significant these changes will be we cannot assess at this time. However, the entire Division of Student Services is undergoing an extensive examination in order to determine what directions to pursue during the next decade. The following discussion will outline the current structure of the Division, suggest the operation of several of its units, and conclude with some specific recommendations for the future.

At present, the Division of Student Services is composed of the following units:

1. Counseling Center
2. Educational Opportunity Program Office
3. Financial Aid Office
4. Division of Health, Physical Education and Athletics
5. Placement Office
6. Student Activities Office
7. Student Center Office
8. Veterans' Affairs Office.

Counseling

The Counseling Center staff provides educational, career, and personal adjustment counseling, both to individuals and groups of students. Testing services are also provided, including career testing as well as tests for admissions, basic skills, advanced placement and credit-by-examination.

The professional staff of three counselors and one secretary represents a 50% cut in personnel from several years ago. The decrease is even greater since one professional devotes one-quarter time to the CAUSE project. The Center has responded to increasing student needs and decreased staff by greater emphasis on group rather than individual counseling and increased productivity on the part of the staff. This has had undesirable consequences, however, in allowing less individual attention to students who probably need more, and in curtailing supervision and planning to provide direct service.

The following conditions argue for a greater need of counselors in the future:

1. A more diversified population: increased numbers of minority students and women
2. A resident population brought about by the dormitory and increased emphasis on housing
3. Increased student options in curriculum, level of courses offered (remedial to honors), and scheduling.

If the Institute is to thrive, it must be willing to devote more individual attention and provide adequate services to its students. The Counseling Center cannot accomplish this without increasing its staff. These staffing increases are needed now and will become critical in the very near future.

Financial Aid

The Financial Aid Office administered $1,992,392 of aid, derived from more than 18 sources, to 2,708 students in the year 1977-1978. This sum is expected to grow to an estimated $2,704,520 of aid to 3,000 students in 1979-80, as shown in Table A10.5 of the Appendix.

To develop resources and administer them effectively in an objective and fiscally sound manner, the financial aid program will require additional staff and office space.

Placement

The additional load borne by the Placement Office as a result of the new programs in Architecture, Industrial Administration, and Man and Technology, in addition to the loss of half-time service of one professional who now serves full-time as Director of Veterans' Affairs, makes additional staff necessary.

Athletics

The Division of Health, Physical Education and Athletics has developed plans for:

1. Improvements for the existing Wasson Athletic Field
2. Expansion of the existing Entwisle Gymnasium athletic facilities.

Items in the first group are essential because the Institute's only playing field is now over-used. Once renovated, consistent annual upkeep will be required to prevent deterioration from recurring.

The second group of items is required to meet Title 9 requirements and provide adequate facilities for women students.

Table 10.5 lists the cost estimates for these improvements.

TABLE 10.5 IMPROVEMENTS IN ATHLETIC FACILITIES

Outdoor Facilities

A.	Wasson Field Renovation	$75,000
B.	Lighting	55,000
C.	Wasson Field Maintenance	10,000/Yr.

Gymnasium Expansion for Women Students

A. Provide facilities and access for women students

B. Provide for separate gymnastic area

C. Provide storage and locker space

Resident Students

In September, 1979, NJIT will open its first dormitory, a 210-bed facility which is the first step in providing on-campus housing for our students.

Despite the fact that several hundred students at present live in nearby fraternity and rooming houses, resident students will make possible a full-time campus, with late afternoon and evening educational activities which cannot flourish with a commuting student body.

A policy for dormitory occupancy and operation is being planned which should support many of the goals outlined in this master plan, including that of attracting N.J. students from outside the commuting range, and out-of-state residents.

The dormitory will be self-supporting, and pay for the services of a resident manager, but it will not pay for the increased services required in other areas. These other costs will be substantial and would hardly be justified for the 210 residents were these other services not to be used by the nearby residents in fraternity and rooming houses as well and also, it is hoped, by many commuting students who will spend more time on campus. Furthermore, the goal is to provide two additional housing units of like capacity, with some of the accommodations suitable for married graduate students and young faculty.

The expansion of services required for residential students consists principally of increased staffing for longer daily hours and weekend operations in Security, Health Services, Library, and the College Center. (The Cafeteria will have to provide more service as well but that, like the dormitory, is self-supporting.)

The Handicapped Student

In the light of barrier-free legislation (504), we can expect a larger number of physically handicapped persons to enroll at the Institute. Facilities must be accessible and special learning aids must be provided as needed.

An Institute committee of faculty, administrators, and students is studying the problem and is attempting to formulate realistic plans for accommodating physically handicapped persons.

These and other related issues continue to be discussed by the Institute as plans develop and as new questions arise.

5. SUPPORTING STAFF

In meeting its educational, research and public service responsibilities, teaching staff should not be expected to spend their time on functions that can be carried out by administrative staff, secretaries, technicians and other support personnel. Expanding graduate programs and additional undergraduate options resulting from a broadening of mission have required a greater array of specialized talent. Similarily, external reporting and compliance requirements mandated by State and Federal law have placed an increasing burden on support personnel. Without destroying the informal atmosphere which serves as a major motivating force in an academic environment, the Institute must encourage continued professional growth among support personnel. Supervisory and middle management personnel play an important role in the over-all educational mission of the Institute and adequate incentives must be developed to maintain the high standards of work performance required of these personnel.

The Institute has a total personnel force of over 600 individuals. The largest segment within the Institute and previously discussed in Chapter IX is the faculty. The administrators number 105 while the para-professionals total 35. The clerical and custodial staff amount to 190.

Portrayed in the following Table 10.6 is the male and female distribution at the Institute for 1977-1978. Numbers of full-time employees tabulated by function are shown in Table A10.6 of the Appendix.

A number of manpower planning factors must be considered in order to provide an appropriate level of support for academic programs. For example, a degree granting department developing a new graduate level program utilizing extensive laboratory and research facilities may require a different support ratio as compared to an undergraduate program dealing in fundamental concepts. Student enrollment trends not only affect manpower planning for faculty staffing but that of support personnel. Recent program developments in Architecture and Computer Science have not only mandated additional support personnel but for those with a level of skills and professional training heretofore not required in staffing traditional educational programs. The Institute must invest the resources required to undertake a comprehensive study of manpower needs.

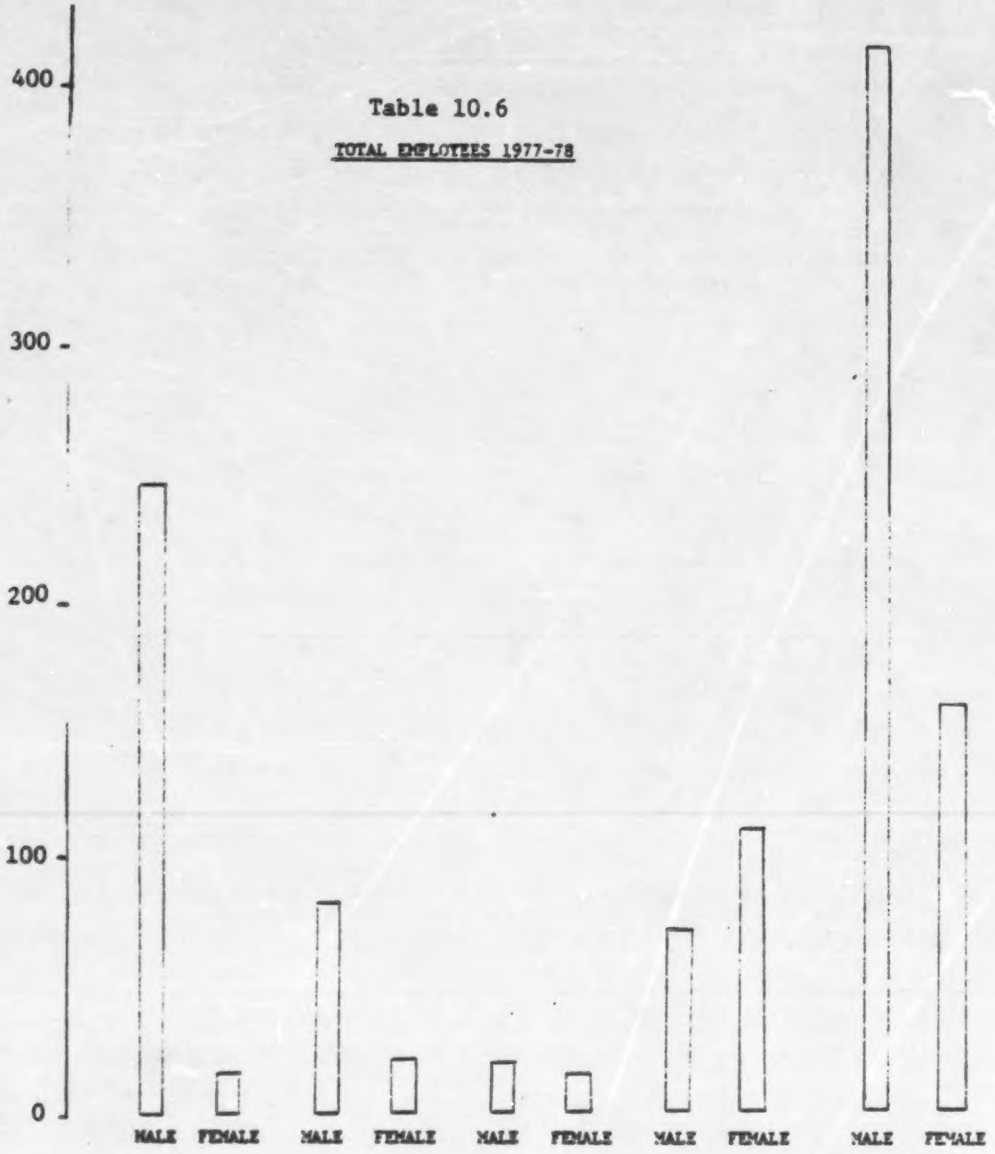
Goal

Encourage better utilization of support personnel and provide means to control the size of support personnel staff by periodic analysis of manpower needs.

The Institute must continue to expand its present efforts to eliminate "dead-end" jobs for its support personnel, and to provide them with a level of support for development activities which is consistent with their career path at the Institute.

Table 10.6

TOTAL EMPLOYEES 1977-78



	INSTRUCTIONAL FACULTY		ADMINISTRATORS		PARA PROFESSIONAL		STAFF		TOTAL	
	234	16	85	20	20	15	75	115	434	166
TOTAL	270		105		35		190		600	

Such activities as tuition remission, job training and career counseling must be expanded. Just as the faculty and professional administrative staff must participate in developmental programs to stay current with changes in the field, so does the same need exist for support staff personnel. Increased resources must be dedicated to provide expanded opportunities for support personnel to keep them current with changes in their respective areas of responsibility.

Goal

Strengthen the role of supervisory and middle management support personnel by providing development opportunities for support personnel and where necessary by supporting implementation of sound manpower practices.

The development of a positive working relationship among all employees is essential to the overall mission of the Institute. While several avenues of effective communication exist for faculty and most professional administrative staff, support staff are unintentionally denied input into the decision making process at operational levels. The Institute must seek to develop appropriate opportunities for essential support level staff to have a voice in decision making at the operational level. A possible model for consideration is the labor/management meeting concept currently being utilized with organized blue collar employees.

While effective communications is an important element in establishing a positive climate for good employee relations, additional programs must be developed in the areas of supervisory relationships training to help first-line supervisors deal more effectively with contemporary work force problems. Specific programs dealing with union contract administration and problems in supervising the "new" work force must be developed. Programs prepared by departments such as Labor Relations would be expanded to include seminars and workshops presented by organizations outside the Institute.

Goal

To meet the changing requirements mandated by applicable state and federal laws governing employee relations the Institute will provide those services required to assist supervisory level personnel in the proper administration of employee relations policy.

CHAPTER XI PUBLIC AND INSTITUTE RELATIONS

For many years the Institute has maintained a relatively low profile in public relations so far as its outside constituencies and the general public have been concerned. This restraint served adequately when expansion in enrollments, public financing, and public awareness made aggressive promotional activities virtually unnecessary.

In the later 1970's circumstances are far different. An insitution cannot develop its reputation without making its activities and its excellence known. In this context the Institute's public relations effort is anachronistic; it must be redirected and comprehensively planned. Inclusion of a chapter on public relations is unusual in a master plan. However, the general perception by faculty, students and alumni that serious gaps exist in this area require definitive planning and Institute commitment.

Industrial recruiters are often unaware of the breadth and substance of our varied degree programs. Media coverage of achievements by students, faculty, and staff is spotty. Nationally, NJIT's reputation is not commensurate with its contributions to the engineering and technical professions and to the promise in its school of architecture.

1. POLICY

Persons in and close to the Institute have frequently voiced the need to shape and project a desirable image for the Institute. An aggressive and adequately funded public relations effort will be essential to accomplish this. It will keep the public informed of our growth, accomplishments, and prospects. It will make known our educational service and research activities. It will enable the Institute to benefit from the public response to news of its programs. To promote these objectives, NJIT's public relations effort must be expanded and closely coordinated with academic and institutional goals.

Public relations must be conducted within a well-defined framework. It must project an accurate and positive image to the public and be sensitive to public concerns about our mission. With these aims in mind, areas of future development for the public relations program are outlined below.

Review of Institute Identification

The Institute's way of identifying itself including graphics treatment and logo, needs careful review to insure the Institute's widespread recognition as the New Jersey Institute of Technology. For consistency, the Institute should project an image of a diversified, yet coordinated and integrated, grouping of professional programs. Our public relations effort must effectively convey to the public a clear picture of our institutional structure -- the internal components and their relationship to each other. Identification of the Newark College of Engineering and of the New Jersey School of Architecture should be such that it designates them as parts of NJIT.

In addition to identification by graphic design and logo, the Institute should be identified by its various professional programs, degree levels, and career paths for graduates. These professional programs include engineering, architecture, science (including computer, information, and organizational), technology, and technology-oriented liberal arts and social science. Degree levels include certificate (Associate), Bachelor's, Master's, Professional, and the Doctorate. Career paths available are in industry and research laboratories, government agencies, large and small firms, units of service industries (health-care delivery, transportation), plus preparation for private practice in fields such as law, urban planning, and medicine. A proper Institute identification would also list the types of service offered, such as degree and continuing education for the professions, for research, public service, information on new technology and technological issues that affect society.

Department Management Policy

Of primary importance to a public relations program as it accelerates and expands is the concomitant need for a more sophisticated management policy. The Department of Public and Institute Relations is an outgrowth of recent decisions to establish a more formal management structure and to divide responsibilities for administering the public relations program. This departmental structure is new and will require periodic review and refinement. As it grows, policy will need to change.

The program moves ahead with efficiency and organizational harmony, but this is as much by informal management decision-making as by any written policy guidelines. Many sensitive areas exist in public relations and are perhaps better safeguarded by formal policy standards than by verbal agreements and/or individual discretion. For example, information might be classified into different levels of importance (e.g., institutional policy statements, major/routine program announcements, display/classified advertising, internal/external publications, etc.) with corresponding levels of management authority required for media contact and/or release. Policy governing the order in which the Institute's many publications are printed would be useful, as well as policy regarding who in the Institue should talk with the press. Should it be, for example, all faculty, all administrators, or merely the public relations department? These are just some of the concerns which should drive our planning toward a comprehensive policy manual in support of an Institute-wide public relations program.

Public Awareness and Institute Capital Development

It is apparent, given the need-analysis emerging from the Institute's long-range planning process, that new sources and levels of financial support must be developed in order to capitalize the improvements in facilities, equipment, and programs necessary to sustain a viable mission in an educational market that is becoming increasingly competitive.*

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*Refer to Chapter XII, Section 4.

In anticipation of this new demand, planning is proceeding now toward the feasibility of a major capital-funds campaign for the Institute, probably several years in scope and beginning soon.

If such a capital effort is to succeed, a broad public awareness program must begin as soon as possible. To date, the Institute's public relations program has been meager and low-keyed, resulting in modest visibility for an important educational institution. While this position may have sufficed in the past, its continuance could prove a serious impediment as private-sector funding becomes more essential to the maintenence of a modern and efficient technological education.

As sources of funding are identified and potentials assessed, a major public awareness program must be staged and launched, as a cultivation process, in order to provide a greater probability of success in the solicitation of funds.

Obviously, such a public awareness program has implications beyond financial development: The public at large would be better informed of Institute activities; spin-off benefits would accrue to students, faculty, staff and alumni who would have greater pride in the reputation of the Institue; job prospects would be enhanced for the Institute's graduates; grant opportunities for faculty researchers could conceivably improve; admissions efforts could be favorably affected both quantitatively and qualitatively; and the Institute would benefit from public reaction to news of its mission and program.

Therefore, a goal of this master plan is to establish a comprehensive public awareness program, with particular parts to be implemented in stages and phased to reach completion as time and resources permit.

2. PROGRAM

The Institute's public relations program divides logically into news/information, publications, special events, and advertising/marketing. These functions provide faculty/student/admissions/development/general institutional support, and in varying degrees of weight are currently responsibilities of the Institute's Department of Public and Institute Relations.

This four-fold program division contains many sub-parts which should be elements in a modern and efficient public relations program. These elements, along with the previously stated policy and identification concerns, are an integral part of the Institute's planning processes. These sub-parts are organized here as Internal and External communications components with respect to the Institute.

A) Internal Communications

1. The first step in planning new programs and activities is often a simple opinion survey. Such a survey provides meaningful statements from the Institute's various constituencies as to how they perceive the Institue and feel others perceive it. These opinions can then be used by the Institute's executives in program planning. (This could be preliminary to a larger-scale professional market survey.)

2. Information gained about opinions should be used to improve structures, methods and techniques of internal communication. Budget priorities should be established to upgrade existing methods of internal communication and to develop new ones.

3. There is a need on campus for greater coordination in planning Institute events. A central calendar of events would provide the information necessary for better coordination as well as furnish the base for improved internal communications in general.

At the present time, the Department of Public and Institute Relations prints and distributes a calendar each month in the form of a poster. The value of this information to the Institute community would be vastly increased if it were more current.

A computer information exchange can be created on campus at modest cost using existing systems. A terminal console in the Public Relations Office can be used to encode a complete calendar of events (and other useful information) for the Institute, and the information will be instantly available in print-out form at any one of the existing sixteen consoles situated around the campus. An additional terminal outlet at the student center could provide students the option of video screen display and/or paper print-out).

Such a system would have the advantages of providing current information updated daily and continuously available, as well as print-out sheets of complete calendar information for posting around campus.

4. A complete and current informational data base for the Institute is essential to good public relations management. Such information provides the base for many of the Institute's admissions and general publications. The Planning Office and the Public Relations Office in this respect should support and reinforce each other. The cross-over with the Admissions Office is also important, and the three offices should seriously consider consulting an organization like CHOICE (Center for Helping Organizations Improve Choice in Education) located at Syracuse University. This is a project supported by the Fund for the Improvement of Post-secondary Education and assists institutions in dealing with the new student expectations concerning the accuracy and completeness of published informatiom provided by institutions, and current federal and state attempts to protect student contractors of educational services through "truth-in-advertising" regulations.

B) External Communications

1. The Institute's mission can be better fulfilled if it conducts a professional marketing survey to assist in the planning process at the Institute. Such a survey may range in scope from demographic studies for purposes of situation analysis to in-depth interviews to determine opinions and attitudes of target audiences. This is a necessary preliminary step toward improved communications with our audience, from alumni and parents to business people and students. A marketing study should result in clearer marketing objectives, more creative message content, and improved media strategy vis-a-vis the public.

2. A substantial media campaign should follow the market analysis. Such a media campaign might include: a) Radio spot announcements (commerical and public service) containing admissions and/or public service information; b) Print media display advertising with insti-

tutional and admissions content in major newspapers; c) Production of a weekly or monthly television program such as "Technology and the Quality of Life" for use on N.J. Public TV and/or TV3 Surburban Cablevision; d) Development of outdoor advertising/information on signs to identify the Institute and show its location. A media campaign should consider consultant budget or provision for public relations professional staff member assigned to advertising/media/audio-visual development.

3. The Institute's Speakers Bureau program should be expanded and accelerated so as to place more faculty and staff in contact with outside constituences and opinion makers.

4. The Institute's news gathering and dissemination process should be analyzed with a view toward improvement. Components of this development should include: a) A plan for cultivating personal media contacts; b) Refinement of existing news release mailing directories; c) A systematic and comprehensive plan for giving the Institute the widest possible listing in educational, governmental, and business directories; d) Design of a better network to facilitate the flow of campus news into the Public Relations Office; e) Implementation of an awareness program with faculty, staff and students on the importance of relaying information to the Public Relations Office and drawing events to the attention of the Public Relations staff; f) Scheduling of occasional press receptions in the interest of better media relations; g) Research and printing of a media guide to be distributed to the working press; this guide would identify key faculty and research projects, and could be used by the media in contacting the Institute; h) Preparation of guidelines for faculty, staff and students to follow in handling media inquiries; i) Preparation of updated biographical profiles of Institute personnel and student leaders. The above components are all parts of a good news bureau and would result in a better relationship with our public opinion environment.

5. The need for a wider public awareness of the Institute and its programs can be greatly aided by the careful planning and management of special program events. Therefore all special events should be analyzed for their public relations value by the professional public relations staff early in the planning of the events. Strong advance and follow-up publicity should be given to those events which are exceptionally newsworthy. This increased emphasis on public relations events management will require additional staff.

6. The publications of the Institute play a principal role in forming its public image. In many instances they are the only point of contact between the Institute and the public. An Institute-wide review of all publications should be made to assure their quality and effectiveness. Such a review should include: a) A simple inventory of all publications. They should be cataloged, with brief annotations describing their contents and indicating how they can be obtained. This list should be made available to members of the Institute community as well as the public; b) An analysis of content. All publications should be analyzed for graphic consistency, completeness and accuracy of information, and compliance with governmental regulations; c) An analysis of format. An analysis should be made to determine if multiple publications could be consolidated into one; common target audiences as well as production and distribution economies may make the consolidation of some publications feasible and desirable; d) An analysis of the whole family of publications. Determination should be made that they are as a whole comprehensive (nothing missing), inter-locking (coordinated), and not redundant; e) An analysis of management. Intra-Institute lines of responsibility and authority should be determined for the authorship, approval, print production, release, and inventory control of all Institute publications; f) An analysis of all ancillary print materials. While these materials are not strictly speaking publications (stationery, business cards, administrative forms, etc.) they do have an impact on the public and therefore should also be reviewed to insure consistent representation of the Institute.

CHAPTER X11 FACILITIES AND RESOURCES

The purpose of this chapter is to provide an overview of the Institute's physical facilities, both those presently available and those that will be required to implement earlier portions of this plan, and the financial resources needed to acquire the additional facilities.

Because of the deadline imposed on this phase of the master plan, it has been impossible to complete the task of setting priorities for our needs and, through a timetable, to link them with realistic projections of expected increments of income. In the next phase of the master plan the Resources Subcommittee will:

(1) begin with a comparative study of present facility usage with respect to state or national standards where applicable, (2) set priorities of future needs related to the objectives of the individual academic and service units of the Institute as put forth in the preceeding sections of this master plan, (3) correlate these needs with projections of factors such as enrollments, new academic and research programs, and (4) propose a timetable relating acquisition to dependency of the Institute on the State and other funding sources necessary for maintaining its general financial "health".

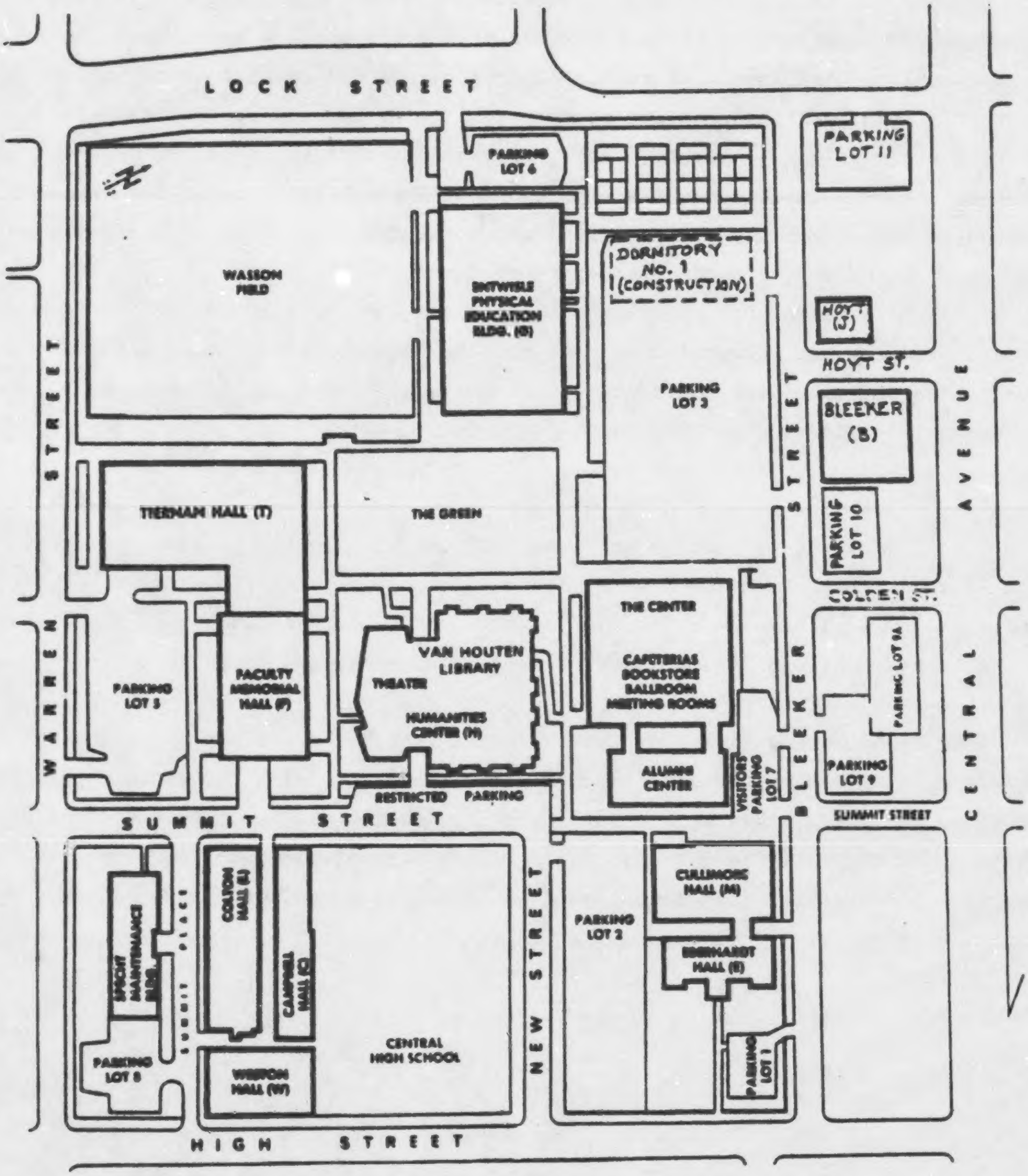
1. THE NJIT CAMPUS

The NJIT campus is located northwest of Newark's downtown business center about one-half mile from the Newark interchange of Interstate Route 280. Its approximately 22.3 acres are bounded (starting from the east and going clockwise) by High Street, Warren Street, Lock Street, and Central Avenue as shown in Figure 12.1.

Located at the northwest corner of Newark's higher education complex, the Institute is in close proximity to the Rutgers-Newark complex and Seton Hall Law School to the east, Essex County College to the south, and New Jersey College of Medicine and Dentistry to the southwest. Saint Michaels Hospital lies to the southeast, and Central High School on High Street is surrounded on three sides by Institute property.

Figure 12.1

THE N.J.I.T. CAMPUS


LOCK STREET
PARKING LOT 6
PARKING LOT 11
WASSON FIELD
ENTWISLE PHYSICAL EDUCATION BLDG. (D)
DORMITORY NO. 1 (CONSTRUCTION)
HOYT (J)
HOYT ST.
PARKING LOT 3
BLEEKER (B)
PARKING LOT 10
WARREN STREET
TIERNAN HALL (T)
THE GREEN
BLEEKER STREET
CENTRAL AVENUE
COLDEN ST.
THE CENTER
CAFETERIAS BOOKSTORE BALLROOM MEETING ROOMS
VAN HOUTEN LIBRARY
THEATER
HUMANITIES CENTER (H)
PARKING LOT 5
FACULTY MEMORIAL HALL (F)
PARKING LOT 9A
PARKING LOT 9
ALUMNI CENTER
VISITORS PARKING LOT 7
RESTRICTED PARKING
SUMMIT STREET
SUMMIT STREET
SPECHT MAINTENANCE BLDG.
SUMMIT PLACE
COLTON HALL (L)
CAMPBELL HALL (C)
CENTRAL HIGH SCHOOL
NEW STREET
PARKING LOT 2
CULLIMORE HALL (M)
EBERHARDT HALL (E)
PARKING LOT 1
PARKING LOT 8
WESTON HALL (W)
HIGH STREET
N

Campus Utilization

Land usage of the campus property is shown in Table 12-1.

TABLE 13.1 NJIT CAMPUS UTILIZATION 1977-1978

Use	Area Acres	Per Cent
Buildings	4.19	18.8%
Construction Site[1]	0.76	3.4%
Parking	4.48	20.1%
Athletics	1.62	7.3%
"The Green" , etc.	3.60	16.1%
Walkways, open space	7.69	34.4%
TOTAL[2]	22.33	100.0%

[1] For dormitory

[2] Does not include 240 High St. and 93 Bleeker St. properties off campus

The Institute's first housing facility, a 210 bed dormitory is located as shown in Figure 13.1.

In addition the Institute owns a building one-quarter mile to the north at 240 High Street, which it has leased to the Newark Board of Education for use as its University High School (formerly known as the "School Within a School"), and a small plot one block to the east on which stands an old and unusable hotel. This latter property was purchased by NJIT for CHEN (Council of Higher Education in Newark), an agency which, for lack of state funding, is now defunct. Intended for remodeling as a joint dormitory venture for the CHEN colleges, the project proved to be financially unfeasible.

Building Utilization

The Institute currently holds approximately 743,500 sq. ft. of floor space. This figure includes 50,000 sq. ft. recently acquired in the Bleeker (200 Central Avenue) building, undergoing renovation for future occupancy by the Department of Mechanical Engineering. It does not include the nearly equal area of 54,000 sq. ft. in the building at 240 High Street, relinquished by the Department of Civil and Environmental Engineering and presently leased to the Newark Board of Education, nor the small factory building (1,700 sq. ft.) on Hoyt St. to be renovated for NJIT Security quarters.

As of July 1, 1977, utilization of the occupied buildings was as shown in Tables 12.2 through 12.5. The actual allocation of this space and the Institute's current needs are appreciably different from projections made in the facilites master plan of 1960*. That plan preceded the construction of 8 buildings financed by the 1958 New Jersey higher education bond issue. It also projected the relocation of the Department of Mechanical Engineering in a building of its own by 1975. That goal is only now about to be realized by the purchase of the Bleeker building at 200 Central Avenue and its renovation just begun.

In addition to the delay in implementing the vacating of existing facilities by the Department of Mechanical Engineering, space utilization has been affected by several factors not perceived in 1960. The most important of these developments is the emergence of the N.J. School of Architecture within the confines of the two oldest academic buildings.

The School, now ready to graduate its first 5th-year class, has each year required additional space for studio and offices as the student body and faculty have grown. The space was available because undergradute engineering enrollments have not grown to the extent planned for in 1960 and because the curriculum contact hours have been decreased. Conversion of space for NJSOA has provided the opportunity for upgrading the facilities within these older buildings, including an area for expansion of the Computer Services Department necessary for its facilities as a northern node of The New Jersey Educational Computer Network**.

Insufficient funds have been available to meet the advancing needs of the School of Architecture so that temporary occupation of an unfinished area in Tiernan Hall has been necessary. This unfinished area has been, for several years, intended for modernized physics laboratories presently located in outmoded quarters in Colton Hall. The Physics Department offices have been moved from Colton to Tiernan Hall but, until funds are available for finishing the laboratory area, the department staff and its laboratories are in different locations.

The relationship of academic areas to staff and student academic use is shown in Tables 12.4 and 12.6 A through D. The first of these relates the number of student stations in each classroom and lecture hall to the area, an average of 19.3 square feet per student in classrooms (including drafting rooms) and 16.2 in lecture rooms. Tables 12.6 A through D relate to laboratory space utilization. For undergraduate laboratories the data of 12.6 A indicate the greater amount of space/student needed for engineering laboratories with bulky equipment

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* Taylor, Lieberfeld and Heldman, Inc. "Report to Newark College of Engineering: a Master Plan for Utilization of Space, Construction of New Facilities and Campus Development", May 1960.

**"Five-Year Computer Plan for NJIT", Rev. Sept. 13, 1976.

TABLE 12.2 SPACE UTILIZATION OF NJIT BUILDINGS

1976-1977

BUILDINGS	FLOOR AREA	ASSIGN-ABLE AREA	CLSRM[1]	LABOR[2]	EDSVC	ADMIN	OTHER
Campbell	36505	29706	1830	16575	1300	8870	1131
The Center[3]	84040	63530	----	----	80	11270	52180
Colton	56280	46014	1700	40594	270	3260	190
Cullimore	61520	38948	9620	----	1495	23113	4720
Eberhardt	28600	12408	---	----	480	11508	420
Faculty	84910	50309	13980	31360	440	2500	2030
Physical Ed. Bldg.	46220	37133	480	----	35420	720	513
Humanities	60530	48637	5190	----	41827	980	640
Specht	13400	9613	---	----	---	1783	7830
Tiernan	155230	104728	17790	66900	1478	13950	4610
Weston	68970	48245	17405	11300	7486	10654	1400
Total[4]	693505	489271	67995	166729	90276	88608	75664
Per Cent		100.0%	13.9%	34.1%	18.5%	18.1%	15.5%

[1] Includes lecture halls, but not the theater

[2] Includes studio, service, and laboratory storage areas

[3] Includes the College Center and Alumni Center

[4] Does not include unoccupied buildings undergoing renovation: Bleeker, 50000 sq. ft. and Hoyt, 1700 sq. ft. Does not include 240 High street, 54,000 sq. ft.

TABLE 12.3 SPACE UTILIZATION OF ACADEMIC DEPARTMENTS

1976-1977

ACADEMIC DEPARTMENTS	TOTAL ASSIGNABLE SQ. FT.	ASSIGNABLE SQUARE FOOT AREAS				
		CLSRM*	LABOR	EDSVC	ADMIN	OTH
Aerospace	1750	420	---	480	850	---
Chem E. & Chemistry	61365	1250	53497	1098	5520	---
Civil & Enviorn. Eng.	18395	1830	10005	70	6490	---
Computer & Info. Sci.	5470	450	1530	220	2830	44
Electrical Engrg.	39670	990	30800	440	7440	---
Humanities	3633	---	---	---	3633	---
Industrial & Mgt. Engrg.	7090	---	3560	516	3014	---
Mathematics	2940	---	---	540	2400	---
Mechanical Engrg.	28354	---	21154	1380	5820	---
Organizational & Soc. Sci.	2220	---	---	---	2220	---
Physics	16193	1100	11893	540	2660	---
Theater & Drama	7920	---	---	7740	180	---
Architecture	30690	1700	24450#	1230	3140	170
Totals	225690	7740	156889	14254	46197	610
Per Cent	100.0%	3.4%	69.5%	6.3%	20.5%	0.3%

#Includes studio and studio storage

*Dedicated to Dept.

TABLE 12.4 CLASS AND LECTURE ROOM FACILITIES
(Figures in parentheses are number of rooms)

1976-1977

	CLASSROOM AREA, SQ. FT.[3]	LECTURE HALL AREA, SQ. FT.[3]	NUMBER OF STATIONS & ROOMS		
			CLASSROOMS		
	Useable	Useable	General	Dedicated	LECTURE HALLS
Campbell Hall	1830			85 (3)	
Colton Hall		1700			60 (1)
Cullimore Hall	9620		630 (18)		
Faculty Hall	12650	1330	830 (24)	95 (3)	80 (1)
Entwisle Phys. Ed.	480			20 (1)	
Humanities[1]	4130	1060	200 (8)		40 (1)
Tiernan	8480	6960	360 (12)		330 (4)
Weston	13185 (2)	3990	355 (12)	24 (1)	416 (1)
Total	50225	15040	2375 (74)	224 (8)	926 (8)

[1] Does not include Theater, 5880 sq. ft., 350 seats

[2] Includes 5 drafting rooms

[3] Does not include service areas

TABLE 12.5 SPACE UTILIZATION OF AMINISTRATIVE UNITS

1976-1977

ADMINISTRATIVE UNITS	ASSIGN-ABLE AREA	EDSVC	ADMIN	OTHER
Research Admin.	1140	----	1140	----
Con't. Education	280	----	280	----
Deans Offices	2450	----	2450	----
Media Center	1070	820	250	----
Library	34117	33267	550	300
Computer Services	4080	3380	700	----
Student Services	84911	35840	17218	31853
Executive Management	3447	----	3447	----
Institutional Support	15988	615	11683	3690
Auxiliary Enterprises	27400	----	680	26720
Total	174883	73922	38398	62563
Per Cent	100%	42.2%	22.0%	35.8%
Operation and Maintenance of Plant	12353	----	1573	10780

fixed in place as compared to the science laboratories.*

While student enrollment is an appropriate measure for undergraduate laboratory utilization, a similarly indicative measure for graduate research laboratories does not exist. The potential for research use of laboratory space is perhaps more a function of department staff numbers than any other simple measure, so Table 12.6 B takes the measure of square feet research area available per department staff member.

Nominally, laboratory service areas (stockrooms, shops and storage) should be added to the laboratory areas of Tables 12.6 A and B. However, many if not a majority of these areas serve both undergraduate and graduate laboratories and cannot be readily apportioned: hence they are separately tabulated in Table 12.6 C.

Using department staff as a measure of both undergraduate and graduate student course enrollments, Table 12.6 D tabulates total (undergraduate plus graduate plus service) area per staff member. The resulting figures have only comparative significance.

Finally, Table 12.7, presents data on external research support for projects assigned to the departmental laboratories.

2. PLAN FOR UPGRADING FACILITIES IN EXISTING BUILDINGS

Goal:

To complete existing plans, as modified by changed circumstances, for renovating the Bleeker building and moving the Mechanical Engineering Department laboratories and offices there; to provide renovated additional space for the N.J. School of Architecture adjacent to present holdings in existing buildings; and to enlarge computer facilities including a computer graphics laboratory.

This goal, already well under way, has several corollary objectives involving upgrading the areas vacated by Mechanical Engineering and converting them for other usage. Thus the stated goal is a program planned to meet several specific objectives:

1. To upgrade facilities for the Department of Mechanical Engineering in its own building
2. To complete the final phase of housing the New Jersey School of Architecture in renovated space located in the oldest academic buildings
3. To unify and expand the Department of Computer Services, enabling its facilities to assume the role of a northern node of the N.J. Educational Computer Network
4. To provide suitable area for the Computer Graphics Laboratory
5. To relocate the Department of Civil and Environmental Engineering laboratories from 240 High Street to the central campus

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*Note that student numbers represent total enrollments in courses assigned to the laboratory. Square feet per student is not square feet per station.

TABLE 12.6 A UNDERGRADUATE LABORATORY SPACE PER STUDENT COURSE ENROLLMENT, 1976-1977
(Exclusive of service/storage areas)
1976-1977

DEPARTMENT	UNDERGRAD. LAB SPACE	LAB. COURSE ENROLLMENT	SQ. FT. PER STUDENT
Chemistry	10,290	1,300	7.9
Chemical Engrg.	16,120	740	21.8
	26,410	2,040	13.0
Civil Engrg.	7,560	620	12.2
Electrical Engrg.	20,980	1,680	12.5
Industrial Engrg.	3,260	240	13.6
Mechanical Engrg.	11,400	458	24.9
Physics	6,040	1,825	3.3
TOTAL	75,650	6,883	11.0

TABLE 12.6 B RESEARCH LABORATORY SPACE PER FULL-TIME FACULTY MEMBER, 1976-1977

DEPARTMENT	GRAD/RESEARCH LAB SPACE	FULL-TIME FACULTY	SQ. FT. PER FACULTY
Chemistry	7,430	17	437
Chemical Engrg.	11,890	11	1080
Civil Engrg.	15,840 *	26	609
Computer Science	1,530	9	170
Electrical Engrg.	5,980	30	199
Environmental Systems	2,510	NA	
Mechanical Engrg.	3,630	32	113
Physics	630	23	27
TOTAL	49,440	148	334

*Not available in 1977-78 due to removal from 240 High Street.

TABLE 12.6C LABORATORY SERVICE AREA

1976-1977

DEPARTMENT	LAB. SERVICE AREA	NO. of ROOMS
Chemistry	6,800	7
Chemical Engrg.	4,920 11,720	14 21
Civil Engrg.	2,445	8
Computer Science	0	0
Electrical Engrg.	3,900	6
Industrial Engrg.	300	1
Mechanical Engrg.	6,330	12
Physics	4,240	8
TOTAL	28,935	56

TABLE 12.6D TOTAL LABORATORY SPACE

DEPARTMENT	TOTAL LAB. AREA	FULL-TIME STAFF	AREA/STAFF
Chem. & ChE	57,450	28	2,052
Civil Engrg.	25,845*	26	994
Computer Science	1,530	9	170
Electrical Engrg.	30,860	30	1029
Environ. Systems.	2,510	NA	NA
Industrial Engrg.	3,560	11	324
Mechanical Engrg.	21,360	32	668
Physics	10,910	23	474
TOTAL	154,025	159	969

*Includes 15480 sq. ft. not available in 1977-78 due to removal from 240 High Street.

TABLE 12.7 RESEARCH SUPPORT

1976-1977 External Funding for Projects Utilizing Laboratory Space

1976-1977

DEPARTMENT	GRAD/RESEARCH LAB SPACE *	TOTAL EXTERNAL SUPPORT**
Chemistry	7430	$36,100
Chem. Eng.	11890	27,600
Civil Eng.	15840***	25,600
Comp. Sci.	1530	226,000
Elec. Eng.	5980	25,000
Environ Sys	2510	165,700
Mech. Eng.	3630	40,560
Physics	630	---
TOTAL	49,440	546,560

* Exclusive of service/storage areas

** Annualized

*** Not available in 1977-78 due to removal from 240 High Street.

6. To provide additional space for the fast-growing Department of Computer and Information Science

7. To upgrade undergraduate laboratories of physics and material science.

The objectives listed above require an interlocking sequence of moves, during which renovation of the space must be accomplished. Some double moves involving temporary quarters are also involved but they are minor in terms of expense and duration and will not be itemized here. The sequence suggested in the following plan is based mainly on expected availability of funding.

Phase 1.

Renovate areas on fifth floors of Colton and Campbell Halls for NJSOA to use beginning Spring 1978.

(Renovation completed) NJSOA space increase: 7500 sq. ft. (24%)

Phase 2.

First stage of moving the laboratories of the M.E. Department from Colton and Weston Halls to the basement and first floors of the Bleeker building, currently being renovated.

Phase 3.

Renovate second floor of Bleeker building and move laboratories and offices of M.E. department. Space increase for M.E. of phases 2 and 3: 2200 sq. ft. (8%) over total existing space.

Phase 4.

Site preparation of the second floor of Colton Hall for use by Computer Services. First stage includes installation of new computer in the spring of 1979.

Phase 5.

Construction of offices on 100-level (second floor) of Weston Hall for Department of Computer and Information Science.

CIS space increase: 5100 sq. ft. (82%)

Phase 6.

Renovate third floor of Bleeker building. Space increase: 1500 sq. ft.

Phase 7.

Second phase of move by Computer Services. Move offices to second floor of Colton Hall, remove existing computer from ground floor of Weston Hall.

Phase 8.

To move into areas vacated by Computer Services and Mechanical Engineering:

1. Civil Engineering laboratories to ground floor Weston Hall
2. Graphics laboratory to 200-floor Colton Hall
3. Add a drafting room for general use

Phase 9.

Relocate undergraduate Physics laboratories in Tiernan Hall on second and fourth floors.

(Includes finishing unfinished area of 9000 sq. ft.)

Physics space increase: 1000 sq. ft. (6%)

Phase 10.

Site preparation of third floor of Colton Hall for NJSOA

NJSOA space increase: 2100 sq. ft. (7%)

When this plan has been implemented the Institute's oldest and its most recently acquired buildings will have been renovated to provide modern facilities for instructional laboratories and architectural studios. The School of Architecture, M.E. department and C.I.S. department will also have additional graduate/research space for studios and laboratories. However, these improvements merely bring the Institute to a state which its facilities should have reached some years ago, had funds been available. No substantial additional space has been created to meet the objectives of the earlier sections of this master plan except for (1) upgraded laboratories (2) graduate programs for Architecture and Computer and Information Science and (3) research space for Mechanical Engineering and Computer and Information Science.

3. FUTURE FACILITIES DEVELOPMENT

As expressed in other sections of this document, campus facilities are not judged to be adequate to meet the projected needs of either the students or faculty. The adequacy of the Institute's facilities has been examined in relation to the goals and objectives expressed in other sections of the document. This master plan has contained objectives of major academic and support units of the Institute which, when implemented, will place a heavy burden upon the physical resources of the Institute.

As a major technological resource of the State, NJIT must be responsive to the needs of New Jersey and the region as a whole. Adequate physical facilities must be found to meet projected enrollment increases in selective career oriented degree programs, growing applied research activities, and related support services associated with the needs of an urban based technological institute.

A principal reason for the Institute to create a comprehensive master plan is the need to integrate its academic needs with those of physical facilities and resource development. Planning for physical facilites and resource development will be done in conjunction with academic plans so that the relationship between academic priorities and costs can be evaluated. In this manner the fundamental decisions regarding resource alloction/reallocation will be made.

Allocation/Reallocation of Existing Space

Before rental or purchase of additional land or buildings is considered for new or expanded activities, every effort must be made to utilize existing facilities. This will mean reallocation of existing space, and will generally involve substantial remodelling costs. It will frequently involve the displacement of some activity under the aegis of a different academic department or support unit. Thus existing facilities must be carefully and continually examined for optimum usage.

Because the Institute values academic achievement, any space allocation/ reallocation effort will require the involvement of the Institute's academic officers, students, and faculty. Participation by faculty must be assured at all stages if their responsibility for educational policy is to be maintained.

Rental/Lease of Facilities

Whenever possible, the Institute should attempt to utilize existing facilities for new instructional and research programs. Programs of limited duration, which require additional space not available on campus, should be housed in leased or rented facilities. Financing of such arrangements should be included as part of the budget preparation for the particular project.

Acquisition of additional facilities including buildings on a temporary basis should be limited to initiating programs with a potential for having the rental costs funded.

Experimental instructional programs, needing space not available on campus, can also be housed in leased facilities until their longer term potential has been established. The cost of such rentals can be met from State formula-generated funds or from general institutional funds put aside for experimental programs.

Land and Building Acquisition

To meet academic and research space needs and to provide some immediate relief for additional parking, the Institute will continue to acquire land and buildings in the area contiguous to the main campus.

Academic and research activities which are described elsewhere in the document take note of the fact that the space currently available for carrying out the Institute's educational and research missions is barely adequate. This situation will become more severe with the anticipated gain in research activities and the need for additional studios and instructional laboratories required to maintain the "state of the art" in professional education.

Maintenance and Rehabilitation

A continuing problem associated with an urban based complex is the maintenance of both buildings and surroundings. The Institute's diverse physical plant requires constant maintenance and rehabilitation. In recent years, signs of aging have begun to appear due to deferred maintenance, and if allowed to continue, will present a serious problem. The Institute must prepare a long-range preventative/deferred maintenance program for the physical plant.

4. FUNDING

New Jersey Institute of Technology is charged with providing educational services, including facilities and personnel, on a budget determined by the State legislature, which views the Institute as one of many sources vying for the limited public dollar. Currently about 70 per cent of the Institute's funds are received through the State Appropriation processs. Another major source of income, grants for research, was discussed in Chapter VI.

Federal and State assistance other than that from the Department of Higher Education has been received in support of certain annual programs. The Educational Opportunity Program, for example, receives such support. The National Science Foundation provides grants for equipment to institutions participating in NSF research activity. An organized Federal-State relations program would undoubtedly increase the potential for additional Federal and State funds in support of annual or time-limited programs.

Participation in on-going programs, such as the National Fund for Minority Students, must also be included in the annual funding.

The final sources of income, gifts to the Institute, come from the Foundation at NJIT, other foundations, the Alumni Association, business and industry, and private sources.

Annual Support Programs

The Foundation at NJIT, established in 1959, has sought support from business and industry for funding developing research and programs. The Institute's close ties with industry has generated an average income level of $150,000, some of which has been limited to specific uses. Equipment grants and certain supply items are received from industries and industrial research laboratories. An aggressive search and request program to increase such gifts would free cash gifts for other uses.

The NJIT Alumni Association has increased its annual contributions to a level of approximately $100,000 annually. Most of the funds are used for maintenance of alumni services and programs, with scholarship aid and some program support directed to the Institute.

To maintain — and improve — the quality of educational programs, public service, and research and to provide the flexibility in fundsfor achieving excellence, NJIT must receive vastly increased contributions from industry, business and friends who recognize the importance of technological talent to the well-being of the State of New Jersey. Whereas historically the Institute has sought thousands of dollars in fund raising goals, it now must ask for millions of dollars, principally for capital needs. Dormitories, renovation of acquired buildings, and development of space to accommodate emerging areas of study are prime considerations in projecting expenditures tied to the future of the Institute. State-of-the-art educational and research equipment is another pressing requirement.

Capital Support Programs

Preparation for fund raising at a level anticipated as essential, requires creation of an appropriate climate among potential benefactors. Establishment of priorities, development of records and systems consistent with the major appeal approach, and involvement of more administrative units within the Institute in the process are required.

During its almost 100 years of existence, NJIT has been involved in only two capital fund raising campaigns, both conducted by the Alumni Association. The first, in the 1960's, resulted in the construction of the Alumni Center for Continuing Education. The second — and current — drive, has resulted in the purchase of the Bleeker building at 200 Central Avenue and several small parcels of land.

Alumni and friends of the Institute have been the principal sources of gifts in the Alumni Association's current fund raising drive, which generated approximately $330,000 last year.

The Foundation at NJIT recently authorized a survey of individuals in the private sector to determine their receptivity to a capital campaign. A listing of needs, a case statement for support of the Institute, and other pertinent data will be used by a professional consultant to establish parameters of funding which are potentially achievable.

Endowments and Deferred Giving

NJIT has endowment funds with a current market value of $400,000 considered low for comparable institutions of higher education. The Alumni Association has a restricted endowment of $160,000, the income providing scholarship assistance to students. A dramatic increase in endowment funds must be considered necessary to to insure stability of income for essential needs.

A major source of funds for many institutions is an organized deferred giving program, generated by annuities, life income and bequests. The NJIT Aumni Association has a limited deferred giving program; the Institute does not. Tax benefits make such plans attractive to the individual donor and beneficial to the institution. An organized program of information and procedures offers the potential for deferred giving from among trustees, overseers, alumni, and friends.

Restricted Gifts

Restricted gifts to the Institute, those designated by the donor for specific use, for the year ending June 30, 1977, amounted to $352,876. Foundation income, other than research-generated funds, amounted to approximately $150,000.

The level of support to both restricted and unrestricted accounts must be substantially upgraded if the goals of the Long Range Plan are to be achievable.

Goals for Fund-Raising

Goal 1

A major capital campaign should be launched in 1979, with goal achieving set for 1981, the Institute's Centennial year. The Alumni Association is engaged concurrently in a capital campaign, already launched, seeking to raise $1,000,000 by 1981. This celebration year should be supported by all segments of the Institute. Through the synergistic efforts of various departments and fund-seeking groups, a momentum can be obtained for the broadest participation from the philanthropic community, seeking support from corporations private foundations, and government agencies.

Goal 2

A program for unrestricted, restricted, and in-kind annual gifts should become viable quickly. The Institute should develop policies to determine overall program needs so that restricted gifts may be encouraged and directed to the appropriate departments. All constituencies of the Institute will be encouraged to seek larger gifts. The Alumni Association will share with the Institute its annual goals and priorities and will intensify efforts to make its members aware of Institute needs. The Foundation similarly will intensify fund seeking efforts.

Goal 3

Foundation and Alumni programs must be intensified and expanded to obtain optimum results from respective constituencies. A goal of $1,000,000 will be established for the next two years, and a target goal will be established for five years. These goals include restricted and unrestricted gifts as well as the value of gifts-in-kind.

Goal 4

A program of deferred giving will be established, oriented in the main toward alumni. This program, in the form of insurance policies, trusts, bequests, etc., is to make provision now for actual gifts to be realized in the future. It begins to provide for the annual and capital purpose needs - which will always exist. The program is traditional for alumni, but should also be encouraged among Institute friends, faculty, staff, parents, and students.

Goal 5

A grantsman function will be established. Federal assistance programs currently play an important role in the financing of the Institute's progress and potential for future development. Utilization of a consultant on Federal programs and support in Washington, D.C. should help develop a definitive matrix to establish an anticipated dollar amount from Federal sources. Increases should occur for research programs, based on the type of research conducted at NJIT and studies of trends in funding by governmental agencies. Programmatic support for the educational advancement of disadvantaged, secondary school faculty and students, and similar specialized education is anticipated at a level of approximately $80,000 annually, based on a review of the Institute's history and available support.

Goal 6

Accepting the premise that the Institute funding from the State is static with the possible exception that additional funds may be made available for research and to compensate for inflation intensified and extended program for State and Federal relations will be established to encourage funding from sources other than education Sector of the N.J. State budget.

CHAPTER XIII INSTITUTE MANAGEMENT: THE PLANNING PROCESS

Traditionally, at NJIT, long-range planning has been the prerogative of the President, who has been assisted by his immediate staff.* Short-range plans for immediate implementation were often made by faculty standing committees.

With the growth of the Institute and the encouragement of faculty governance through the Faculty Council, new procedures emerged which involved all segments of the Institute. The 1972 Middle States Case Study produced an academic master plan which involved many faculty members through several thoroughly organized and well-directed committees. Subsequently an Institute Long-Range Planning Committee was set up and each academic department was directed to set up its own committee. No comprehensive master plan evolved, however, because the committees had neither the resources to assemble the required data, nor the administrators to interpret the data and guide the planning process.

In the summer of 1975 the President appointed a Special Assistant for Institute Research. In the Fall an Assistant for Planning was hired and, together with the Special Assistant for Institutional Research and the Institute Archivist, the nucleus of a department of Institutional Research and Planning was formed.

Much of the supporting data on student-faculty ratios, academic department instructional costs, and space utilization, missing from this phase of the master plan, must await completion of the database system or the dedication of many hours of clerical personnel time. Thus far a database for space allocation has been developed and a Library database is undergoing tests.

---

* As noted earlier, a consulting firm was employed to assist in the development of the facilities plan which preceded the New Jersey 1968 issue for higher education.

1. PHASE I: MASTER PLAN (PRESENT SUBMISSION)

When work on the current Master Plan was begun in August 1977, the Institute was organized as shown in Figure 13.1. The Institute standing committees and their responsibilities, are listed in Table A13.1 of the Appendix. The President assumed chairmanship of the Long-Range Planning Committee, which was organized with seven subcommittees for the purpose of developing the master plan. Several other existing committees whose functions had included planning were also assigned a role.

Figure 13.2 indicates the planning organization. The Long-Range Planning subcommittees are shown by solid lines and the involved Institute standing committees by dashed lines in the third column of the chart. The interactive nature of the planning process is not shown in this figure.

The direct involvement of approximately ten per cent of the Institute staff on the committees has made both faculty and administration more aware of joint concerns and resources available to the Institute.

In addition, departmental planning committees have had a formal input and all faculty and staff have received progress reports. Two open hearings have been held. Unfortunately the final draft will not be completed until after the close of the spring semester, but will be distributed to the departments as points of reference for the next phase.

2. PHASE II: MASTER PLAN (ESTABLISHMENT OF PLANNING CYCLE)

The Institute is now emerging from an era in which little formal planning has taken place. At present NJIT depends on the accumulated knowledge, intuition and good judgment of its administrative staff. However, the pressure of the staff's daily responsibilities prevent it from developing a comprehensive and integrated approach to making all basic educational and financial decisions. Therefore, the Institute must be able for the future to plan in a more comprehensive manner as the ad hoc method set up for this first phase is no longer sufficient for our needs.

The planning cycle envisioned will require the involvement of the whole Institute in a coordinated, orderly yearly cycle.

The framework for such a cycle is shown in Figure 13.3*, which includes the process required for developing the plan of Figure 13.2 into a continuing

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*Satish B. Paresh, "Long-Range Planning", Chapter 1, pg. 12. New Rochelle, N.Y.: Change Magazine Press, 1975.

Figure 13.1

NJIT ORGANIZATION CHART

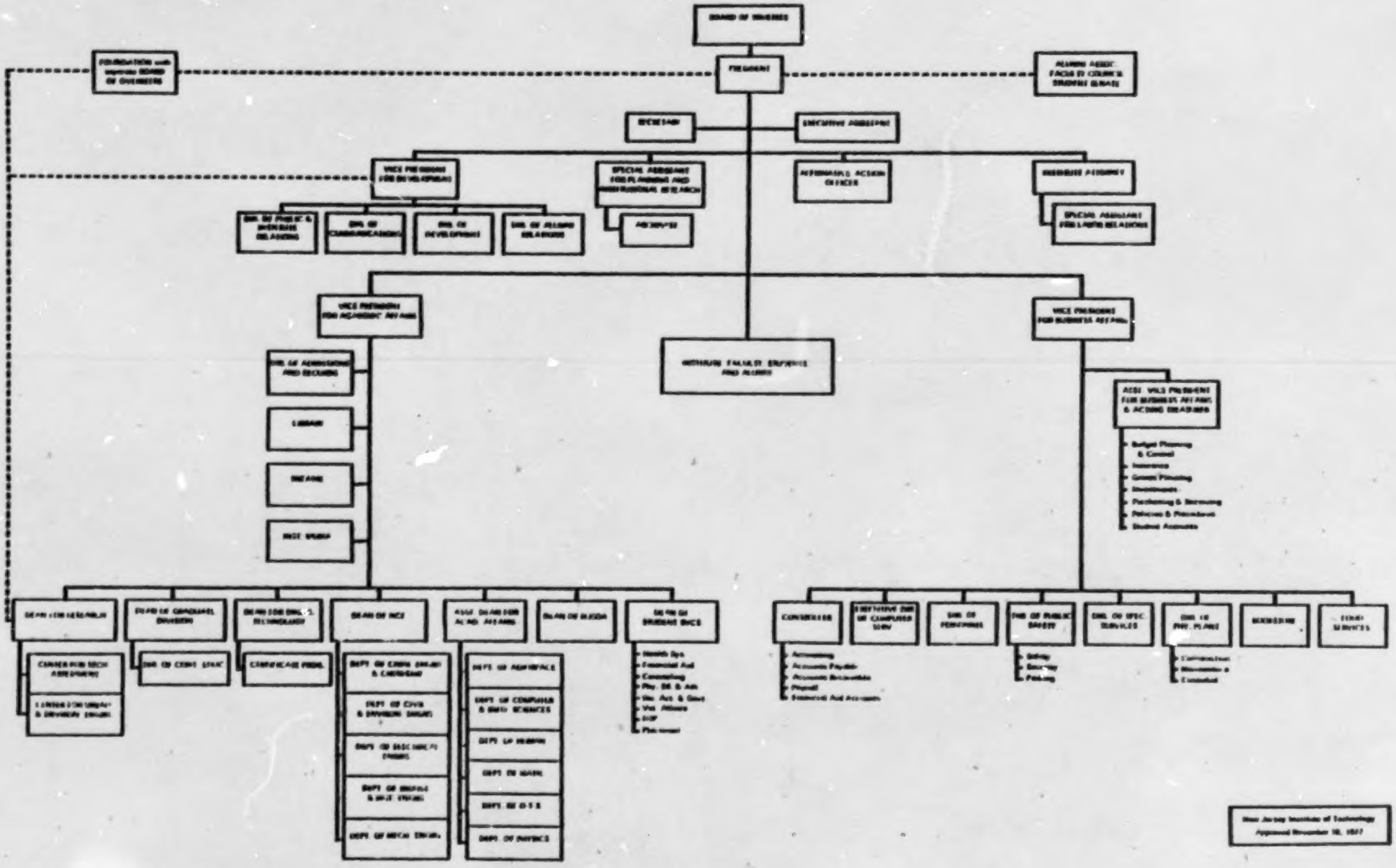
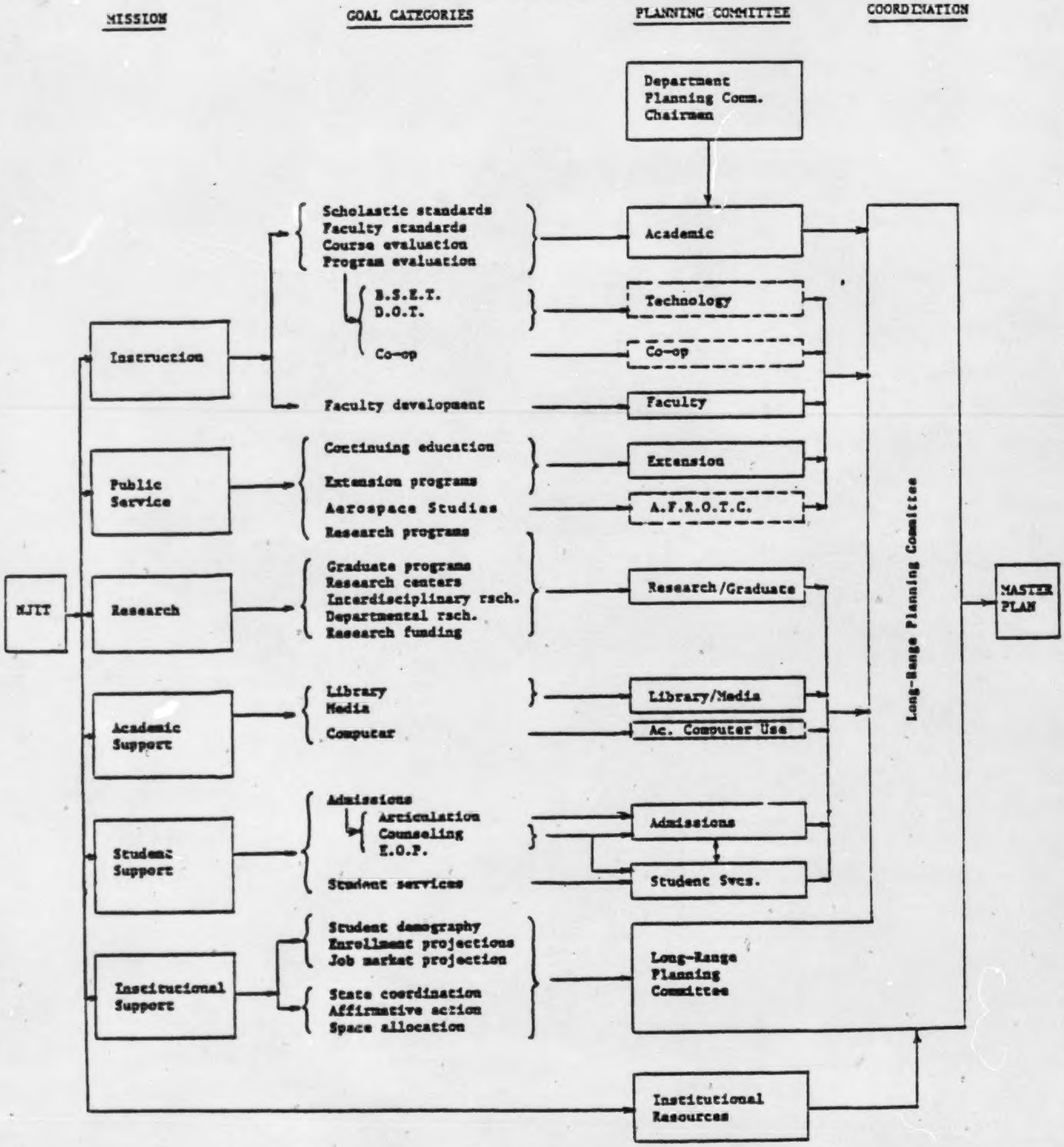

FOUNDATION with separate BOARD OF OVERSEERS
BOARD OF TRUSTEES
PRESIDENT
ALUMNI ASSOC. FACULTY COUNCIL STUDENT SENATE
SECRETARY
EXECUTIVE ASSISTANT
VICE PRESIDENT FOR DEVELOPMENT
SPECIAL ASSISTANT FOR PLANNING AND INSTITUTIONAL RESEARCH
AFFIRMATIVE ACTION OFFICER
INSTITUTE ATTORNEY
DIR. OF COMMUNICATIONS
DIR. OF DEVELOPMENT
DIR. OF ALUMNI RELATIONS
ARCHIVIST
SPECIAL ASSISTANT FOR LABOR RELATIONS
VICE PRESIDENT FOR ACADEMIC AFFAIRS
VICE PRESIDENT FOR BUSINESS AFFAIRS
LIBRARY
ASST. VICE PRESIDENT FOR BUSINESS AFFAIRS & ACTING TREASURER
Budget Planning & Control
Insurance
Investments
Purchasing & Receiving
Policies & Procedures
Student Accounts
DEAN OF NCE
ASST. DEAN FOR ACAD. AFFAIRS
DEAN OF STUDENT SVCS
Health Svs
Financial Aid
Counseling
Phy. Ed. & Ath.
Stu. Act. & Govt.
Vet. Affairs
EOP
Placement
DEPT OF CIVIL & ENVIRON. ENGRG.
DEPT OF MECH. ENGRG.
DEPT OF MATH
DEPT OF PHYSICS
CONTROLLER
Accounting
Accounts Payable
Accounts Receivable
Payroll
Financial Aid Accounts
DIR. OF PERSONNEL
DIR. OF PUBLIC SAFETY
Safety
Security
Parking
DIR. OF SPEC. SERVICES
DIR. OF PHY. PLANT
Construction
Maintenance &
Custodial
BOOKSTORE
FOOD SERVICES
New Jersey Institute of Technology
Approved November 10, 1977

Figure 13.2


MISSION
GOAL CATEGORIES
PLANNING COMMITTEE
COORDINATION
Department Planning Comm. Chairmen
Scholastic standards
Faculty standards
Course evaluation
Program evaluation
Academic
B.S.E.T.
D.O.T.
Technology
Co-op
Co-op
Instruction
Faculty development
Faculty
Continuing education
Extension programs
Extension
Public Service
Aerospace Studies
A.F.R.O.T.C.
Research programs
Graduate programs
Research centers
Interdisciplinary rsch.
Departmental rsch.
Research funding
Research/Graduate
NJIT
Research
Long-Range Planning Committee
MASTER PLAN
Library
Media
Library/Media
Academic Support
Computer
Ac. Computer Use
Admissions
Articulation
Counseling
E.O.P.
Admissions
Student Support
Student services
Student Svcs.
Student demography
Enrollment projections
Job market projection
Institutional Support
State coordination
Affirmative action
Space allocation
Long-Range Planning Committee
Institutional Resources

MASTER PLAN ORGANIZATION

FAR
10/25/77
1/9/78

annual process. The iterative nature of the activities near the center of Figure 13.3 is illustrated in Figure 13.4.

To coordinate the planning and present the needed data for such planning will require the establishment and development of a formal Office of Institutional Research and Planning.**

The Director of Institutional Research and Planning reports to the President and should be responsible for institutional planning, data collection, research design, analysis, assignment and review. The Assistant Director should be responsible for all external Institute data submission, as well as all data regarding faculty and staff facilities, academic courses, students and finance. Since at present no one office or individual is responsible for the collection and updating of all of these data it is essential for the Office of Institutional Research to perform this task on a regular ongoing basis. To do so will, however, require at least one additional staff member with para-professional qualifications.

In many institutions the Data Base Administrator reports to the Institutional Research director and is considered a customer, rather than a staff member, of the Division of Computer Services. Such reporting inhibits conflict of interest between data source and data processor and, more important, provides the required coordination between the Assistant Director of Institutional Research and the Data Base Administrator who manages the flow of data.

3. INSTITUTE PROCEDURES

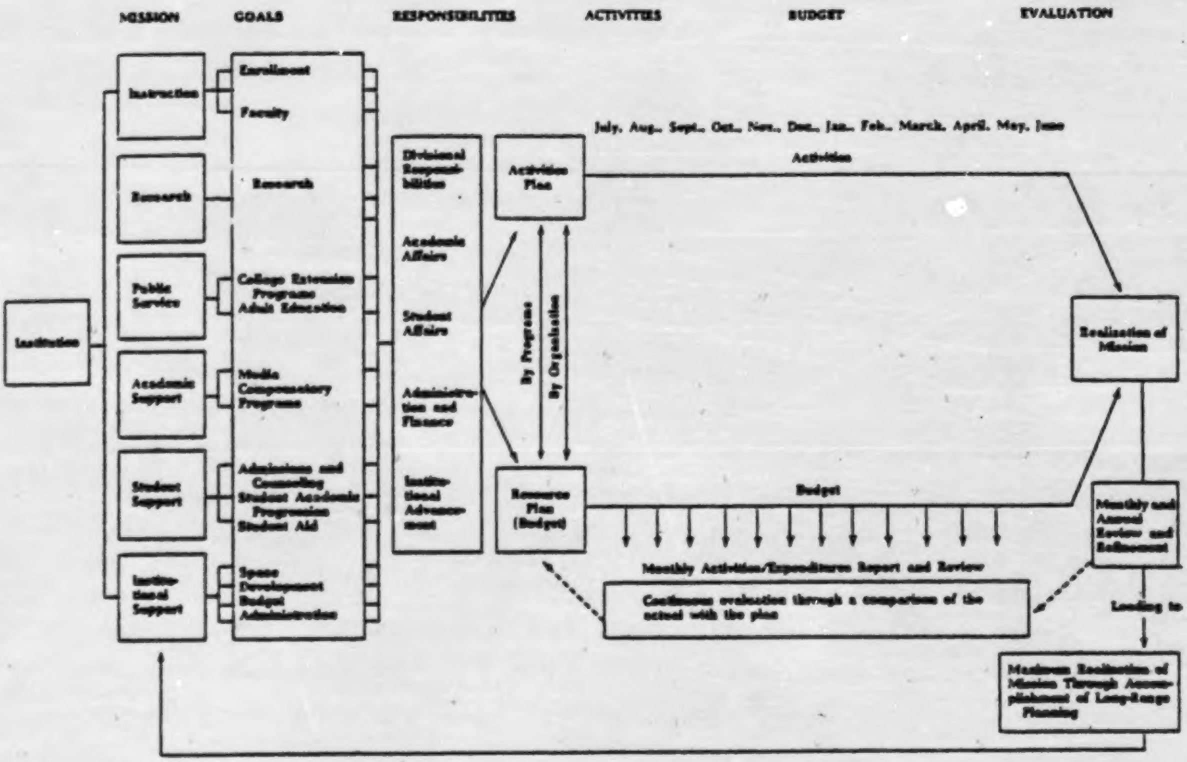
Over the past year our Archivist and an outside consultant have been compiling a manual of Institute policies and procedures which have developed over the years. This much needed manual, now nearing completion, will be an up-to-date guide for the Institute staff.

A goal for the coming year is to expand this manual to include all aspects of administrative operation.

**Institutional Research, is defined by the Association for Institutional Research as "a multi-disciplinary profession that draws on the relevant techniques and insights of modern management science and educational psychology, welding them into a new analytic approach to institutional governance and the general problems of higher education."

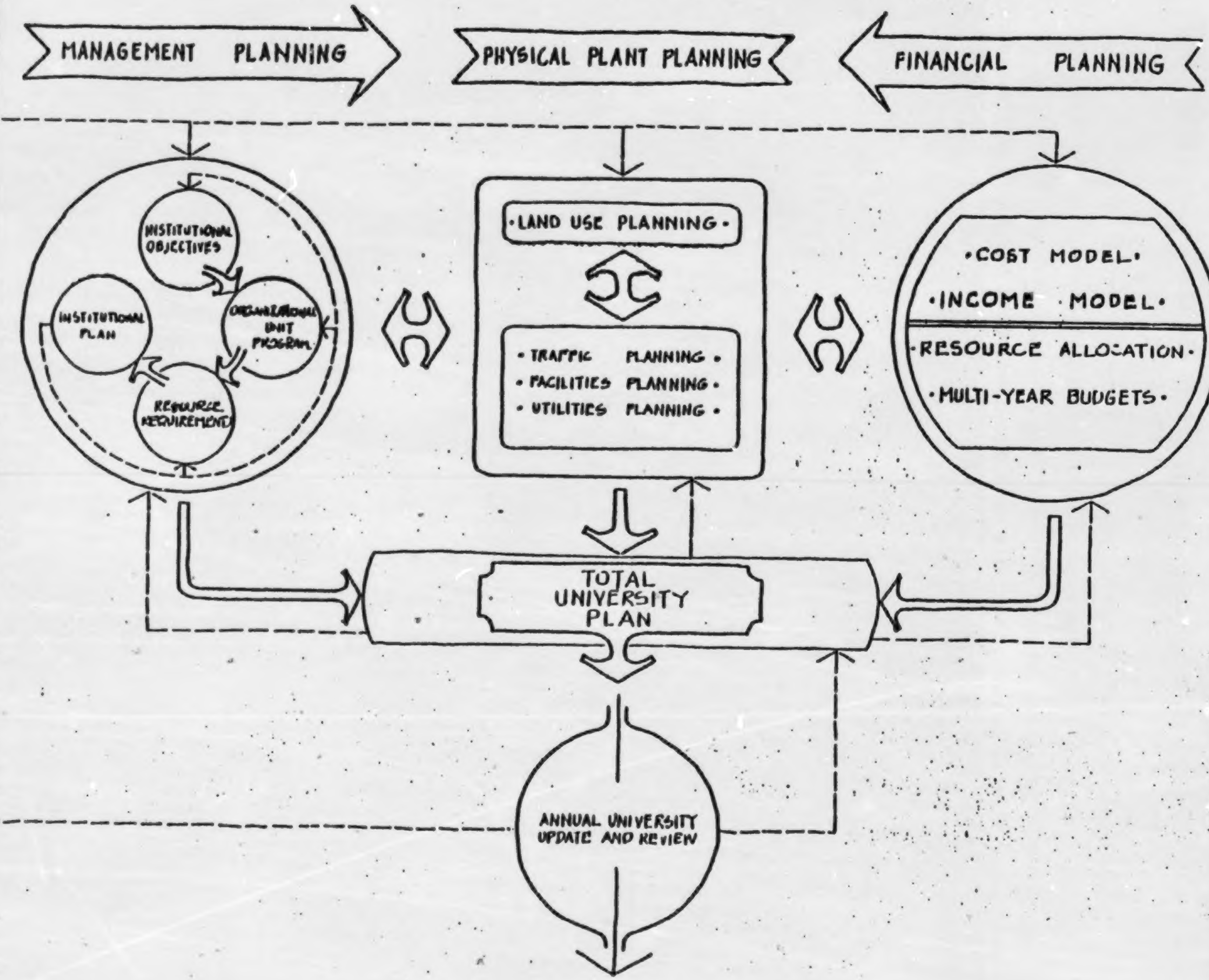
Figure 13.3

LONG-RANGE PLANNING/COMPREHENSIVE MANAGEMENT SYSTEMS MODEL


MISSION
GOALS
RESPONSIBILITIES
ACTIVITIES
BUDGET
EVALUATION
Institution
Instruction
Research
Public Service
Academic Support
Student Support
Institutional Support
Enrollment
Faculty
Research
College Extension Programs
Adult Education
Media
Compensatory Programs
Admissions and Counselling
Student Academic Progression
Student Aid
Space
Development
Budget
Administration
Divisional Responsibilities
Academic Affairs
Student Affairs
Administration and Finance
Institutional Advancement
Activities Plan
Resource Plan (Budget)
By Programs
By Organization
July, Aug., Sept., Oct., Nov., Dec., Jan., Feb., March, April, May, June
Activities
Budget
Monthly Activities/Expenditures Report and Review
Continuous evaluation through a comparison of the actual with the plan
Realization of Mission
Monthly and Annual Review and Refinement
Leading to
Maximum Realization of Mission Through Accomplishment of Long-Range Planning

Source: "Long-Range Planning", by Satish B. Parekh

Figure 13.4


MANAGEMENT PLANNING
PHYSICAL PLANT PLANNING
FINANCIAL PLANNING
INSTITUTIONAL OBJECTIVES
ORGANIZATIONAL UNIT PROGRAM
RESOURCE REQUIREMENTS
INSTITUTIONAL PLAN
LAND USE PLANNING
TRAFFIC PLANNING
FACILITIES PLANNING
UTILITIES PLANNING
COST MODEL
INCOME MODEL
RESOURCE ALLOCATION
MULTI-YEAR BUDGETS
TOTAL UNIVERSITY PLAN
ANNUAL UNIVERSITY UPDATE AND REVIEW

Budgeting Process

The Institute will continue its development of a comprehensive, coordinated budget process which will include revenue and expense projections, contingency plans, and a control data base as integral parts. The budget process will be coordinated with both long-range and short-range planning activities of the Institute.

Budgeting is complex. Each department projects the resources it needs. However, the total resources available are inevitably less than the sum of the departmental requests, so some requests will of necessity not be granted. The iterative review process resulting in a final balanced budget should be carried out with participation of the departmental officers.

A revenue/expense projection model is shown in Figure 13.5. Since the Institute receives approximately 70 per cent of its funds from the State Higher Education Budget, it is difficult to calculate total expected revenue. Historic and changing patterns of state appropriations can serve only as a guide to projections. Since significant enrollment growth is not anticipated, no major increase can be expected in tuition income, unless the tuition were to be increased.

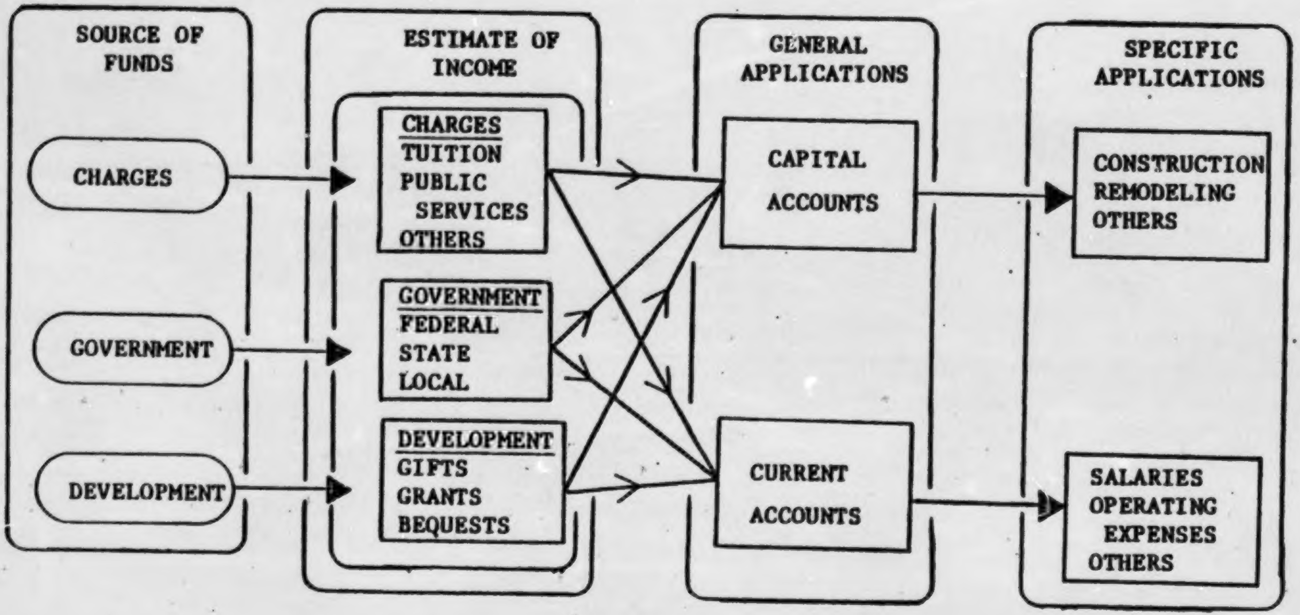
The present method of funding, which is in large part dependent on enrollment, creates a unique problem for the Institute particularly when a decline in enrollment may be temporary. Engineering enrollment is an example of such a temporary decline. The Institute is faced with the problem of obtaining sufficient support for its engineering programs at a time when enrollments may not be rising. The need for providing a fixed level of support irrespective of enrollment fluctuations is obvious, and future budget planning must try to resolve such problems.

The Institute in recognizing the pressing need for an integrated planning cycle must organize a contingency effort which will lead to a continuing five-year plan linking academic needs with physical facilities and resource developments.

Academic administrators will have to lead in the difficult area of determining educational costs. Indices, such as cost per student credit hour, can be misleading due to the complication of joint costs for undergraduate and graduate functions, joint costs of academic and support roles, etc. Because of present complexities, greatly improved measures of program input and output costs will have to be developed. Progress in the direction has begun with the introduction of the present budget cycle, although much remains to be done if the Institute is to develop a reliable measurement and information system.

Figure 13.5

Revenue/Expense Projection Model


SOURCE OF FUNDS
CHARGES
GOVERNMENT
DEVELOPMENT
ESTIMATE OF INCOME
CHARGES
TUITION
PUBLIC SERVICES
OTHERS
GOVERNMENT
FEDERAL
STATE
LOCAL
DEVELOPMENT
GIFTS
GRANTS
BEQUESTS
GENERAL APPLICATIONS
CAPITAL ACCOUNTS
CURRENT ACCOUNTS
SPECIFIC APPLICATIONS
CONSTRUCTION
REMODELING
OTHERS
SALARIES
OPERATING EXPENSES
OTHERS

APPENDICES

LONG-RANGE PLANNING COMMITTEE

C. R. Bergmann
Chairman

A. Allentuch
L. B. Andersen
J. Campbell - Staff Secretary
J. Gasienica
E. Golub
R. Helfgott
E. Hodge - Staff Editor
D. Kristol
N. Holtzman
A. Lacy
F. Lehman
H. Mauermeyer
J. O'Connor
R. Progelhof
A. Pulhamus
F. Russell
A. Shukur
E. Smithberg
D. Tassios
H. Thompson

LONG-RANGE PLANNING SUBCOMMITTEES

ACADEMIC

J. Campbell
E. Golub
E. Hodge
J. Kopf
R. Jacobs
E. Smithberg*
D. Tassios
S. Winters

ACADEMIC DEPARTMENT PLANNING

E. Golub*
D. Hanesian
R. Helfgott
M. Levy
G. Moshos
J. Pattinson
J. Rigassio
E. Smithberg
J. Strano
L. Salzarulo
H. Thompson
H. Zatzkis

ADMISSIONS

L. Buteau
J. Campbell
D. Getzin
R. Helfgott
N. Holtzman*
L. Morrison
C. Wilson
J. Ross
S. Pasiliavich - student

CONTINUING EDUCATION

A. Bedrosian
J. Campbell
P. Cheremisinoff
K. Diehl
R. Progelhof*

FACULTY

L. B. Andersen
W. Ball
J. Campbell
F. Lehman
E. Hodge
D. Wall

*Chairperson

INSTITUTIONAL RESOURCES

R. Albers
A. Allentuch
R. Fryer
D. Gibson
A. Gilbert
D. Hanesian
H. Kimmel
A. Lacy
J. Lubin
H. Mauermeyer
R. Meola
W. Michels
A. Pulhamus*
J. Rigassio
L. Schmerzler
E. Stamper

LIBRARY/MEDIA

P. Anderson
J. Campbell
T. Featheringham
J. O'Connor*
S. Van Dyk
W. Reynolds
M. Snowhite

PUBLIC SERVICE

S. Bordman
J. Campbell
H. Deutschman*

RESEARCH/GRADUATE

A. Allentuch*
D. Blackmore
S. Cheng
H. Mauermeyer
H. Perlis
B. Stevenson

STUDENT SERVICES

C. Beatty
J. Gasienica
M. Kinkade
D. Kristol
R. McMillan
O. Moiseenko
L. Morrison
A. Shukur*
M. Guyer - student

TABLE A2.1 SUMMARY LIST OF NJIT PROGRAM OFFERINGS

UNDERGRADUATE PROGRAMS

- Bachelor of Architecture
- Bachelor of Science
  - Chemical Engineering
  - Civil Engineering
  - Electrical Engineering
  - Industrial Engineering
  - Mechanical Engineering
  - Computer Science
  - Engineering Science
  - Engineering Technology
  - Industrial Administration
  - Man and Technology

GRADUATE PROGRAMS

- Master of Science
  - Chemical Engineering
  - Civil Engineering
  - Electrical Engineering
  - Environmental Engineering
  - Industrial Engineering
  - Management Engineering
  - Computer Science
  - Applied Science (for secondary school teachers)
  - Applied Mathematics
  - Engineering Science
  - Interdisciplinary combinations of above fields
- Degree of Engineer
  - Chemical Engineering
  - Civil Engineering
  - Electrical Engineering
  - Mechanical Engineering
- Doctor of Engineering Science
  - Chemical Engineering
  - Civil Engineering
  - Electrical Engineering
  - Mechanical Engineering

ADMISSIONS 1978

New Jersey Institute of Technology

PROFILE OF THE 1977 FRESHMAN CLASS

We in the Admissions Office at New Jersey Institute of Technology hope that our admissions profile of currently enrolled freshmen will guide you in counseling students interested in the various programs offered by the Institute.

Several years ago the Institute expanded its curriculum offerings from engineering to computer science, architecture, Industrial Administration, Technology and "Man and Technology." The various charts and distribution tables contained in the next few pages include statistics for all of these programs. It is our hope that this information will assist you in evaluating the chances of your high school seniors being admitted to the Institute.

We continue to experience an increase in the number of women attending NJIT. At present there are more than 250 women enrolled in our full and part-time undergraduate programs. We hope that in the process of counseling young women you will encourage those for whom it is appropriate to investigate NJIT.

May we also call your attention to our cooperative education program. It is a practical method of offering students industrial exposure as part of their total academic experience. Cooperative education is available as an option to Mechanical and Industrial engineering students.

	1976	1977
APPLIED (NON-EOP)	1534	1580
ACCEPTED (NON-EOP)	909	1056
ENROLLED (NON-EOP)	549	574
EOP ENROLLED	77	74*
TOTAL FRESHMEN	626	648

MEN – 591 WOMEN – 57

* The Educational Opportunity Program figures reported here are not included in the Freshman Class Profile.

FINANCIAL AID AVAILABLE

Through our Financial Aid Office, aid is available to students who demonstrate the need for such assistance. Funding comes from federal, state, industrial, and other outside sources; it results in awards of grants, loans, and work-study aid.

Our own application must be filed with the Financial Aid Office by all interested students. In addition all students must file an IRS form and a (FAF) Financial Aid Form with Princeton. All forms can be obtained from the Financial Aid Office.

ENGINEERING / ENGINEERING SCIENCE / COMPUTER SCIENCE

DISTRIBUTION BY SAT MATH SCORES AND CLASS RANK IN SECONDARY SCHOOLS

S.A.T. MATH RANGE	HIGH SCHOOL DECILE RANK							RANK NOT* AVAILABLE	TOTALS	%	% SCORING AT OR ABOVE
	1	2	3	4	5	6	7-10				
750–800	3	1	2						6	1.3	1.4
700–749	8	4	4		5	2	2	3	28	5.9	7.1
650–699	15	11	9	3	2	4	1	2	47	9.9	17
600–649	12	20	19	3	7	6	3	2	72	15.1	32.1
550–599	18	23	23	20	19	14	14	3	134	28	60.1
500–549	14	16	21	19	23	13	10	4	120	25.1	85.1
Below 500	4	11	13	13	11	7	4	7	70	14.7	100
TOTALS	74	86	91	58	67	46	34	21	477		
Percentage	15.5	18.1	19.1	12.2	14	9.6	7.1	4.4			
% RANKING AT OR ABOVE	15.9	33.8	52.8	64.8	78.6	88.1	95.3	100			

DISTRIBUTION BY MATH (LEVEL 1) ACHIEVEMENT SCORES

(Engineering/Engineering Science/Computer Science)

Math Achievement Range	No.	Percentage	% Scoring At or Above
750 – 800	06	01.3	01.3
700 – 749	18	03.8	05.1
650 – 699	35	07.8	12.9
600 – 649	70	15.6	28.5
550 – 599	115	25.5	54.0
500 – 549	112	24.9	78.9
450 – 499	71	15.8	94.7
Below 450	24	5.3	100.0

MEAN SATs (Verbal, Math, and Combined), and High School Decile Rank for 1977 Freshmen.

	Verbal SAT	Math SAT	Combined SAT	Decile
Engineering, Engineering Science Computer Science	448	568	1020	3.1
Pre-Architecture	491	598	1091	2.2
"Man and Technology"	425	478	896	4.7
Bachelor of Science Industrial Administration	420	513	933	4.3
All Majors	452	569	1035	3.1

PRE-PROFESSIONAL ARCHITECTURE

DISTRIBUTION BY COMBINED SAT MATH & VERBAL SCORES & CLASS RANK IN SECONDARY SCHOOLS

S.A.T. COMBINED SCORE	HIGH SCHOOL DECILE RANK							Rank Not* Available	TOTALS	%	% SCORING AT OR ABOVE
	1	2	3	4	5	6	7-10				
1501–1600											
1401–1500											
1301–1400		1							1	1.3	1.3
1201–1300	7	1	1	1	1				11	14.9	16.2
1101–1200	11	5	4	1	2	1		1	25	33.8	50
1001–1100	1	3	6	4	2	1	1		18	24.3	74.3
901–1000	3	3	4	3	2	1		1	17	23	97.3
801–900		2							2	2.7	100
701–800											
Below 700											
TOTALS	22	15	15	9	7	3	1	2	74		
Percentage	29.7	20.2	20.2	12.2	9.5	4.1	1.4	2.7			
% RANKING AT OR ABOVE	29.7	49.9	70.1	82.3	91.8	95.9	97.3	100			

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*Rank not available includes students with decile ranks that would tend to be misleading: (e.g.: ex-servicemen, prep school graduates and other students whose atypical credentials might present a distorted impression.)

BACHELOR OF SCIENCE/INDUSTRIAL ADMINISTRATION/"MAN AND TECHNOLOGY"

DISTRIBUTION BY COMBINED SAT MATH & VERBAL SCORES & CLASS RANK IN SECONDARY SCHOOLS

S.A.T. COMBINED SCORE	HIGH SCHOOL DECILE RANK							Rank Not Available	TOTALS	%	% SCORING AT OR ABOVE
	1	2	3	4	5	6	7-10				
1501-1600											
1401-1500											
1301-1400											
1201-1300											
1101-1200						1			1	4.3	4.3
1001-1100			1		1		1		3	13	17.3
901-1000				2	1	1	3		7	30.4	47.7
801-900		3	1	2		2	1		9	39.3	87
701-800			1		1				2	8.7	95.7
Below 700			1						1	4.3	100
TOTALS		3	4	4	3	4	5		23		
Percentage		13	17.4	17.4	13	17.4	21.8				
% RANKING AT OR ABOVE		13	30.4	47.8	60.8	78.2	100				

GEOGRAPHIC DISTRIBUTION

The members of the 1977 Freshman Class of NJIT are graduates of 216 in-state high schools, 8 out-of-state and 13 foreign high schools. Over 98% of this class are New Jersey residents; the distribution by counties is as follows:

COUNTY	NUMBER	PERCENTAGE
ESSEX	117	20
BERGEN	106	18
UNION	73	12.5
PASSAIC	65	11.1
HUDSON	61	10.5
MORRIS	54	9.3
MIDDLESEX	45	7.7
MONMOUTH	22	3.8
SOMERSET	13	2.2
OCEAN	5	2.9
MERCER	3	
SUSSEX	2	
WARREN	2	
HUNTERDON	2	
CAMDEN	1	
ATLANTIC	1	
CUMBERLAND	1	
OUT-OF-STATE	7	1.2
FOREIGN	4	.7

ACADEMIC RECORD OF THE CLASS OF 1980 (Current Sophomores)

Traditionally, approximately 80% of our freshmen return as sophomores. It appears as though this same pattern has taken place this year.

HIGH SCHOOLS WITH MOST FRESHMEN ENROLLED

NUTLEY HIGH SCHOOL	15
BLOOMFIELD HIGH SCHOOL	12
CLIFTON HIGH SCHOOL	12
WOODBRIDGE HIGH SCHOOL	12
ESSEX CATHOLIC HIGH SCHOOL	10
HUDSON CATHOLIC HIGH SCHOOL	10
SETON HALL PREP.	10
ROSELLE CATHOLIC HIGH SCHOOL	9
HANOVER PARK HIGH SCHOOL	8
WEST ESSEX HIGH SCHOOL	8
CRANFORD HIGH SCHOOL	7
DePAUL DIOCESON HIGH SCHOOL	7
LIVINGSTON HIGH SCHOOL	7
THOMAS JEFFERSON HIGH SCHOOL	7
WAYNE HILLS HIGH SCHOOL	7
HILLSIDE HIGH SCHOOL	6
VAILSBURG HIGH SCHOOL	6

SCHOOL BACKGROUND

Enrolled	441 (75.6%) Public
	129 (22.1%) Independent
	2 (.3%) G.E.D.
1976 High School Graduates	541 (92.8%)
Graduated prior to 1976	42 (7.2%)

NJIT does not discriminate on the basis of sex, race, age, religion, national origin, or handicap in its educational programs, activities, or employment policies. The Institute has committed itself to a program of affirmative action and compliance with Title IX.

TABLE A3.1

AVERAGE ANNUAL JOB OPENINGS, 1974 - 1985*, PROFESSIONAL AND MANAGERIAL OCCUPATIONS IN NEW JERSEY

OCCUPATION	DUE TO GROWTH	DUE TO SEPARATION	TOTAL JOB OPENINGS	PER CENT OF 1977 EMPLOYMENT
Engineers, Total	901	949	1,843	3.56
Chemical	149	70	219	4.33
Civil	129	161	290	4.15
Electrical	225	190	415	3.49
Industrial	41	129	169	2.33
Mechanical	231	190	421	4.15
Chemists	176	230	405	3.44
Physicists and Astronomers	28	20	49	3.65
Mathematicians	44	18	62	8.99
Engineering and Scientific Technicians	1,246	1,013	2,258	4.59
Electrical, Electronic Technicians	91	83	174	2.90
Industrial Eng. Tech.	44	44	88	
Mechanical Eng. Tech.	18	12	30	4.18
Surveyors	77	32	109	6.08
Engineering Science Tech.	348	287	635	5.66
Computer Specialists	591	193	783	4.87
Computer Systems Analysts	234	58	292	5.22
Urban and Regional Planners	14	8	22	7.04
Architects	377	363	739	9.30
Personnel, Labor Relations	489	467	955	5.71
Bank Financial Managers	452	608	1,060	6.11
Health Administrators	273	325	598	8.90

*Source: U.S. Department of Labor, Bureau of Labor Statistics. Preliminary, subject to revision.

TABLE A3.2

PROFESSIONAL EMPLOYMENT STATISTICS: STATE OF NEW JERSEY

OCCUPATION*		
Architect		7,950
Chemist		11,800
Computer Specialist		16,080
Computer System Analysts		5,600
Engineers		41,361
Chemical	5,059	
Civil	6,984	
Electrical	11,896	
Industrial	7,275	
Mechanical	10,147	
Health Administrators		6,700
Industrial Management		34,125
Personnel	16,725	
Financial Managers	17,400	
Mathematicians		700
Physicists		1,350
Technicians - Engineering & Scientific		49,200
Urban Planners		310
		170,136

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*Source: U.S. Department of Labor, Bureau of Labor Statistics, 1977 Preliminary, subject to revision.

Figure A4.1

**D.H.E.
RESEARCH NOTES**

Note 77-2 December 1977

HIGHLIGHTS OF FALL 1977 ENROLLMENTS IN NEW JERSEY

Over 9,000 more students were attending New Jersey colleges and universities this fall than one year ago. Final figures show that the Opening Fall Enrollment for 1977 was 299,907, an increase of 3.2% over 1976. Total undergraduate enrollment increased 2.5% over last year, while the graduate and first-professional total increased nearly three times as much (6.9%).

	Fall 1975		Fall 1976		Fall 1977	
College Sectors	Total Enrollment	% Change Over 1974	Total Enrollment	% Change Over 1975	Total Enrollment	% Change Over 1976
Public Colleges	233,540	+9.3%	226,585	-3.0%	235,137	+3.8%
Independent Colleges	62,243	+1.0%	64,054	+2.9%	64,770	+1.1%
All N.J. Colleges	295,783	+7.4%	290,639	-1.7%	299,907	+3.2%

**Index of Undergraduate Enrollments
in New Jersey
(Base Year 1968 = 100)**

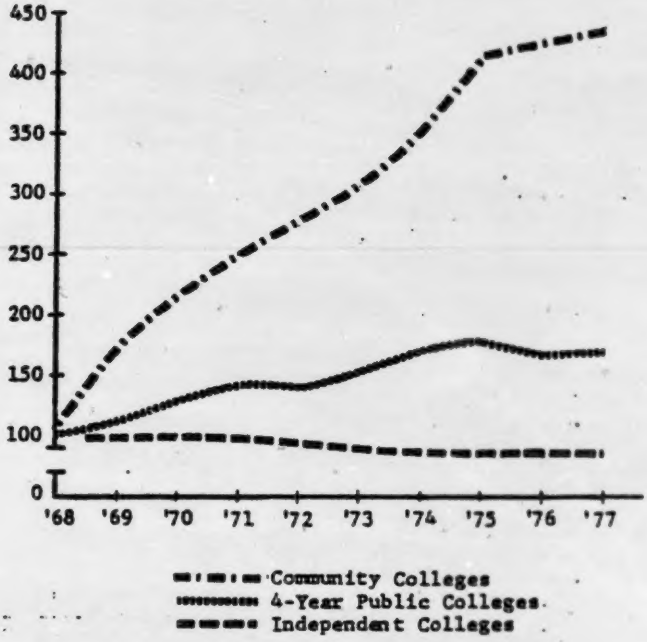

TABLE A4.1 NJIT FALL ENROLLMENTS, 1970-1977

	1970	1971	1972	1973	1974	1975	1976	1977
FRESHMEN	890	667	533	539	773	867	756	860
DAY UNDERGRAD	3071	2897	2581	2470	2632	2962	3102	3117
EVE. UNDERGRAD	997	922	892	887	849	952	956	962
SUB-TOTAL	4068	3819	3473	3357	3481	3914	4058	4079
NEW GRAD. STUDENTS		219	274	302	345	266	211	224
FULL-TIME GRAD.	106	136	139	121	137	168	145	134
PART-TIME GRAD.	936	879	912	1006	1123	1032	1002	966
SUB-TOTAL*	1042	1015	1051	1127	1260	1200	1147	1100
MAINT. REGIS. GRAD. STU.	--	78	78	107	103	84	84	77
DIV. OF TECH**	951	705	588	501	623	618	623	641
TOTAL***	6061	5539	5118	4985	5364	5732	5828	5820

* Includes inactive students maintaining regisstration as shown on next line.

** BSET enrollments are included with undergraduate

***Does not include Continuing Education

TABLE A4.2 FALL 1977 UNDERGRADUATE ENROLLMENT

(Figures in parentheses are new students)

STUDENTS	ENROLLMENT
DAY UNDERGRADUATE	
FRESHMEN	860 (756)
SOPHOMORES	713 (102)
JUNIORS	922 (123)
SENIORS (Include 5th year ARCH.)	622 (1)
SUBTOTAL	3117 (982)
EVENING UNDERGRADUATE	
UPPER DIVISION	625 (84)
LOWER DIVISION	337 (104)
SUBTOTAL	962 (188)
TOTAL	4079 (1170)

TABLE A4.3 FALL 1977 ENGINEERING ENROLLMENT BY MAJOR FIELD AND CLASS

(Figures in parentheses are *new* students)

DAY UNDERGRADUATE	CHE	CE	EE	IE	ME
FRESHMEN	110(103)	100(80)	209(185)	18(15)	155(135)
SOPHOMORE	92(12)	99(16)	146(35)	23(4)	151(14)
JUNIOR	144(3)	133(6)	133(6)	37(0)	157(8)
SENIOR	89(0)	73(0)	110(0)	26(0)	68(0)
SUBTOTAL	435(118)	405(102)	598(226)	104(19)	531(157)
EVENING UNDERGRADUATE	CHE	CE	EE	IE	ME
UPPER DIV.	36(3)	57(5)	86(5)	32(4)	59(3)
LOWER DIV.	36(15)	46(12)	78(23)	14(2)	67(19)
SUBTOTAL	72(18)	103(17)	164(28)	46(6)	126(22)
TOTAL	507(136)	508(119)	762(254)	150(25)	657(179)

TABLE A4.4 FALL 1977 ENROLLMENT IN BSET PROGRAMS

OPTION	ENROLLMENT		1977 GRAD-UATES
	FULL-TIME	PART-TIME	
	179	270	161
Construction/Contracting	50	74	51
Electrical Systems	42	72	39
Environmental	19	6	17
Manufacturing	22	54	33
Mechanical Systems	46	64	21
	179	270	

TABLE A4.5 - COURSE TALLY FOR CERTIFICATE PROGRAMS, 1976-1977*

	Course Tally	1977 Grad.
Architectural Technology	105	9
Construction Technology	200	9
Electrical Technology	341	20
Mechanical Technology	276	14
Plastics Technology	74	3
Individual Courses	254	2**
TOTAL	1,250	57

*Offered for part-time evening students only.

**Industrial Chemical Technology (1); Tool Dessign(1).
Note: Students in Certificate courses are not included in enrollment headcounts.

TABLE A4.6 FALL 1977 ARCHITECTURE ENROLLMENT
(Figures in parentheses are new students)

(DAY) PRE-ARCHITECTURE	ENROLLED
FRESHMEN	110(100)
SOPHOMORE	87(4)
SUBTOTAL	197(104)
(DAY)ARCHITECTURE	
THIRD YEAR	85(25)
FOURTH YEAR	104(0)
FIFTH YEAR	
SUBTOTAL	189(25)
TOTAL	386(129)

TABLE A4.7 FALL 1977 ENROLLMENTS IN ESc and CS
(Figures in parentheses are new students)

	ESc	CS	TOTAL
DAY UNDERGRADUATE			
FRESHMEN	16(16)	58(54)	74(70)
SOPHOMORES	15(0)	38(2)	53(2)
JUNIORS	31(10)	47(1)	78(11)
SENIORS	23(0)	19(0)	42(0)
SUBTOTAL	85(26)	162(57)	247(83)
EVENING UNDERGRAD.			
LOWER DIV.	10(3)	23(3)	33(6)
UPPER DIV.	7(2)	27(1)	34(3)
SUBTOTAL	17(5)	50(4)	67(9)
TOTAL	102(31)	212(61)	314(92)

TABLE A4.8 FALL 1977 ENROLLMENTS IN OTHER UNDERGRADUATE PROGRAMS

(Figures in parentheses are new students)

DAY UNDERGRADUATE	BSIA	M & T	U.D.[1]	N.M.[2]	TOTAL
FRESHMEN	18(13)	17(14)	24(23)	25(16)	84(66)
SOPHOMORES	33(3)	15(1)	1(1)	13(10)	62(15)
JUNIORS	54(13)	5(1)	0(0)	6(2)	65(16)
SENIORS	29(0)	3(0)	0(0)	4(1)	36(1)
SUBTOTAL	134(29)	40(16)	25(24)	48(29)	247(98)

EVENING UNDERGRADUATE	BSIA	M & T	U.D.[1]	N.M.[2]	TOTAL
UPPER DIVISION	21(1)	2(0)	0	27(15)	50(16)
LOWER DIVISION	13(3)	1(0)	14(3)	35(21)	62(27)
SUBTOTAL	34(4)	3(0)	14(3)	62(36)	112(43)

[1] Undecided on major

[2] Non-matriculated

TABLE A4.9 GRADUATE
DIVISION ENROLLMENT, FALL 1977

I. Degree Students

A. Master's Degree

	New Students		Total Enrollment	
Chemical Engineering	28	(17)	73	(73)
Civil Engineering	37	(27)	131	(132)
Electrical Engineering	24	(28)	110	(114)
Environmental Engineering	28	(24)	89	(84)
Industrial/Mgt. Engineering	34	(28)	159	(174)
Mechanical Engineering	14	(19)	65	(76)
Chemistry	9	(3)	23	(21)
Computer & Info. Sciences	18*	(27)	102**	(110)
Mathematics	3	(6)	11	(13)
Org. & Social Sciences	5	(12)	20	(13)
Applied Sciences	17	(8)	50	(46)
Nuclear Power Systems	N/A	(0)	N/A	(10)
	217	(199)	833	(866)

TOTAL M.S. ENROLLMENT - 833 (866)

B. Doctoral Degree

	New Students		Total Enrollment	
Chemical Engineering	3	(5)	15	(16)
Civil Engineering	1	(4)	3	(8)
Electrical Engineering	2	(2)	25***	(25)
Mechanical Engineering	0	(0)	6	(10)
	6	(11)	49	(59)

TOTAL DOCTORAL ENROLLMENT - 49 (59)

C. Degree of Engineer

	New Students		Total Enrollme	
Chemical Engineering	0	(0)	1	(1)
Civil Engineering	0	(1)	3	(4)
Electrical Engineering	1	(0)	3	(4)
Mechanical Engineering	0	(0)	1	(1)
	1	(1)	8	(10)

TOTAL DEGREE OF ENGINEER ENROLLMENT - 8 (10)

II. Non-Degree Students

Special	63@	(49)
Post-Master's	37@@*	(43)
NJIT Undergraduates	3¢	(5)
CHEN Exchange Students	30	(31)

TOTAL NON-DEGREE ENROLLMENT - 133 (12

Total Active Enrollment	1023	(1063)
Maintaining Registration	77	(84
GRAND TOTAL	1100	(1147)

() Figures in parentheses represent corresponding enrollment for Fall 1976.
* Includes 3 Students at Drew. ** Includes 22 students at Drew.
*** Includes 2 Students at Ft. Monmouth.
@ Includes 2 Students at Ft. Monmouth.
@@* Includes 8 Students at Ft. Monmouth and 1 at Drew.
¢ Includes only those NJIT undergraduates registered for graduate credit.

EHS:jep
10/6/77

TABLE A4.10 FALL 1977 ACADEMIC ENROLLMENT MATRIX, F.T.E. STUDENTS[1]

(Figures in parentheses represent part-time students)

DIVISION / PROGRAM	Certificate Prog. (Evg.)	Lower Division (Day)	Lower Division (Evg.)	Upper Division (Day)	Upper Division (Evg.)	Graduate Division	TOTALS
Div. of Technol.	— (235.0)	2.8 —	— (0.7)	1.6 (0.4)	— (0.1)	— —	4.4 (236.2)
Engrg. Technol.	— —	44.5 (1.4)	2.6 (28.3)	84.2 (2.8)	3.7 (49.5)	0.2 —	135.2 (82.0)
Engineering[3]	— —	202.2 (3.9)	2.8 (29.0)	365.4 (27.7)	13.1 (66.9)	61.9 (219.5)	845.7 (347.0)
Architecture	— —	129.9 (2.7)	— —	120.0 (10.3)	— —	— —	249.9 (13.0)
Applied & Engrg. Sci.	— —	— —	— —	— —	— —	1.2 (5.4)	1.2 (5.4)
Rutgers/ECC	— —	24.8 (0.1)	— —	15.4 —	— (0.1)	— —	40.2 (0.2)
Chemistry	— —	178.5 (2.2)	1.1 (17.3)	55.4 (2.2)	0.4 (7.0)	3.5 (11.0)	238.9 (39.7)
Computer Sci.	— —	91.1 (2.6)	0.7 (14.4)	26.5 (2.8)	0.8 (11.6)	8.9 (37.3)	128.0 (68.7)
Humanities	— —	205.1 (4.1)	1.1 (11.4)	106.6 (3.7)	4.1 (14.2)	0.5 —	317.4 (33.4)
Indus. Mgt.	— —	12.0 (0.9)	0.7 (1.3)	15.5 (0.3)	0.3 (2.6)	— —	28.5 (5.1)
Mathematics	— —	329.7 (9.5)	1.7 (24.2)	35.6 (3.5)	1.8 (9.1)	7.2 (18.2)	376.0 (64.5)
Mechanics	— —	71.7 (1.7)	0.9 (9.6)	17.9 (0.4)	0.7 (4.1)	— —	91.2 (15.8)
Org. &Soc. Sci.	— —	129.3 (4.3)	1.8 (17.6)	122.0 (5.8)	3.3 (18.0)	4.7 (24.0)	261.1 (69.7)
Physics	— —	264.8 (2.8)	0.4 (17.0)	10.9 (1.9)	0.4 (4.7)	0.7 (1.5)	277.2 (27.9)
Phys. Ed.	— —	41.6 (1.0)	— —	1.3 —	— —	— —	42.9 (1.0)
TOTALS[2]	— (235.0)	1728.3 (37.2)	13.8 (171.1)	1178.3 (61.8)	28.6 (187.9)	88.8 (316.9)	3037.8 (1009.6)
							4047.4

Data as of October 10, 1977

[1] To obtain projected 1977-78 annualized values including 5% attrition for second semester, multiply F.T.E. by 0.975, except for first column

[2] To obtain total annual F.T.E. add 232 F.T.E. for summer enrollment.

[3] Includes Engrg.Graphics, Nuclear Engineering, and Aerospace Studies.

TABLE A4.11 FALL 1977 ENGINEERING ENROLLMENT MATRIX, F.T.E. STUDENTS[1]

(Figures in parentheses represnt part-time students)

DIVISION / PROGRAM	Lower Division (Day)	Lower Division (Evg.)	Upper Division (Day)	Upper Division (Evg.)	Graduate Division	TOTALS
Chemical Engrg.	20.7 (0.1)	0.1 (4.9)	110.5 (1.7)	1.9 (7.3)	16.0 (36.2)	149.2 (50.2)
Civil Engrg.	36.8 (0.7)	1.0 (3.9)	106.1 (2.4)	2.3 (13.7)	8.7 (39.7)	154.9 (60.4)
Environmental Engrg.	0.3 —	— (0.5)	3.5 (0.7)	0.1 (1.1)	6.7 (21.9)	10.6 (24.2)
Electrical Engrg.	52.9 (0.6)	0.9 (9.6)	172.1 (5.9)	3.6 (21.3)	13.3 (44.5)	242.8 (81.9)
Industrial Engrg.	11.3 (0.1)	0.7 (4.2)	49.7 (1.8)	3.3 (8.5)	8.2 (58.7)	73.2 (73.3)
Mechanical Engrg.	22.6 (0.6)	— (5.4)	109.7 (7.3)	1.8 (14.4)	8.8 (18.5)	142.9 (46.2)
Engrg. Graphics	56.5 (1.4)	0.1 (0.5)	7.1 (0.6)	0.1 (0.5)	— —	63.8 (3.0)
Nuclear Engrg.	0.1 —	— —	3.0 (0.3)	— (0.1)	2.0 —	3.3 (0.4)
Aerospace Studies	1.3 (0.4)	— —	3.7 (7.0)	— —	— —	5.0 (7.4)
TOTALS, ENGRG.[2]	202.5 (3.9)	2.8 (29.0)	565.4 (27.7)	13.1 (66.9)	61.9 (219.5)	845.7 (347.0)
						1192.7

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[1] To obtain projected 1977-78 annualized values including 5% attrition for second semester, multiply F.T.E. by 0.975.

[2] Does not include summer session.

TABLE A4.12 FALL 1977 ENGRG. TECHNOL. ENROLLMENT MATRIX, F.T.E. STUDENTS[1]
(Figures in parentheses represent part-time students.)

DIVISION / PROGRAM	Lower Division (Day)	Lower Division (Evg.)	Upper Division (Day)	Upper Division (Evg.)	Graduate Division	TOTALS
Construction Tech.	6.8 (0.2)	— (5.0)	14.1 (0.4)	— (12.2)	— —	20.9 (17.8)
Environ. Tech.	5.0 —	— —	4.8 (0.1)	— —	— —	9.8 (0.1)
Elec. Systems Tech.	8.9 (0.6)	0.3 (6.7)	11.3 (0.7)	0.5 8.8	0.2 —	21.2 (16.8)
Manufacturing Tech.	8.7 (0.1)	1.6 (9.5)	29.1 (0.3)	1.6 (18.5)	— —	41.0 (28.4)
Mech. Systems Tech.	14.9 (0.3)	0.5 (7.1)	24.7 (1.1)	1.5 (9.9)	— —	41.6 (18.4)
TOTALS, ENGRG. TECH.	44.3 (1.2)	2.4 (28.3)	84.0 (2.6)	3.6 (49.4)	0.2 —	134.5 (81.5)
						216

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[1] To obtain projected 1977-78 annualized values including 5% attrition for second semester, multiply F.T.E. by 0.975.

TABLE A6.1

SURVEY OF RESEARCH EXPENDITURES BY ENGINEERING SCHOOLS*

Institution	Graduate and Undergraduate Students and Postdoctoral Fellows Engaged in Research	Faculty in Research (Funded)	Other Full Time Research Personnel	Research Expenditures (in dollars)
Clarkson College of Technology School of Engineering	111	51	8	$ 1,020,000
Drexel University College of Engineering	145	45	20	1,996,923
New Jersey Institute of Technology Newark College of Engineering	46	37	2	919,967
Polytechnic Institute of New York Division of Engineering	95	78	42	2,866,000
Rensselaer Polytechnic Institute School of Engineering	250	67	32	4,090,430
Rutgers, The State University of New Jersey College of Engineering	106	37	9	1,286,659
Stevens Institute of Technology College of Engineering and Science	110	34	47	3,133,000
Worcester Polytechnic Institute	128	44	24	2,858,000

*Engineering Education, March 1977, Vol. 67, No. 6.

(For the 1975-76 academic year)

TABLE A7.1

CONTINUING EDUCATION PROGRAMS AND REGISTRANTS - JULY 1977 THROUGH JUNE 3, 1978

PROGRAM NAME	DATES	# REGISTRANTS
Quality Control Mgt.	July 1977	12
Managing Prev. Maint.	July 1977	12
Mgt. Pract. Non-Union	August 1977	9
PLP-EAST	August 1977	120
Shop Floor Control	September 1977	20
Arch. Design	Sept-Jan 1977-8	7
Sales Eng. Conf.	Sept-Dec. 1977	59
Control Devices	Sept-Dec. 1977	15
Mini-Computer Systems	September 1977	24
Industrial-Hazard. Wastes	October 1977	13
Intro. Air Pollution	October 1977	12
Wastewater Treatment	October 1977	19
SPE/RETEC	October 1977	230
Service Parts Mgt.	October 1977	14
Foreign Personnel	November 1977	45
Operations Audit	November 1977	19
Microprocessors & Microcomputers	Nov - Feb. 1977-8	25
Quality Control Engrg.	December 1977	19
Environmental I.S.	January 1978	24
Solar Energy	January 1978	7
Arch.Design	Jan - May 1978	15
Sales Eng. Conf.	Feb. - May 1978	40
Control Circuits	Feb. - May 1978	7
Microprocessors & Microcomputers	March - May 1978	25
Microcomputer Design	March - May 1978	25
Funds. Maint. Mgt. 1st-line	March 1978	21
Funds. Mgt. Warehouse	March 1978	9
Design of Structures	March -May 1978	11
Shop Floor Control	April 1978	9
Quality Con.Mgt.	April 1978	16
N.J. Writers Conf.	April 1978	230
Operations Audit	May 1978	30
Purch.Policies	May 1978	14
Manufacturing Cost. Est.	May 1978	14
Faculty Microprocessors Course	May 1978	26
Specification of Particulate Control Equip.	May 1978	21
Technical Writers #1	June 1978	20
Architectural "Dry Run"	June 1978	34
	TOTAL AS OF 6/3/78	1,272

Geographical breakdown of registrants*:

New Jersey	585
New York	70
Pennsylvania	16
Washington, D.C.	6
Ohio	2
Virginia	3
Massachusetts	4
Rhode Island	2
Connecticut	4

PLP-East
*Does not include: SPE/RETEC - N.J.Writers Conf.

TABLE A9.1 NJIT FULL-TIME INSTRUCTIONAL STAFF: FALL 1977

		RANK						DEGREE			SEX	
N	DEPT	DIST PROF	PROF	ASSOC	ASST	INST	SPEC LECT	PhD	MS	BS	MALE	FEMALE
21	ARCH		1	10	8	-	2	1	16	4	19	2
23	CHEM		5	8	7	-	3	21	2	-	21	2
15	ChE		5	3	5	-	2	13	2	-	14	1
30	CEnE		7	9	11	-	3	19	11	-	30	-
12	CIS		1	2	8	-	1	9	3	-	11	1
31	EE	1	11	12	6	-	1	22	9	-	31	-
3	H&PE		1	2	--	-	-	--	3	-	3	-
24	HUMAN		8	5	9	1	1	19	5	-	21	3
13	IME		6	3	1	-	3	9	3	1	13	-
24	MATH	1	4	10	9	-	-	17	6	1	22	2
31	ME		10	13	5	-	3	17	14	-	31	-
17	OSS	1	3	4	8	-	1	8	9	-	13	4
26	PHYS		5	11	8	-	2	16	10	-	25	1
270	N=12	3	67	92	85	1	22	171	93	6	254	16
						TOTALS						

Note: Excludes 9 administrators holding academic rank.

TABLE A9.2 NJIT TENURE BY ACADEMIC DEPARTMENT: FALL 1977

ACADEMIC UNIT	FULL-TIME FACULTY	FULL-TIME + PART-TIME FTE FACULTY	NUMBER TENURED	PER CENT TENURED	
				FULL-TIME BASIS	FTE BASIS
Architecture	22	28.5	1	5	4
Ch.E/Chem.	39	51.5	21	54	41
C. & EnV. Eng.	29	35.0	17	59	49
C.I.S.	12	18.0	2	17	11
Elec. Eng.	31	36.0	23	75	64
Health/P.E.	3	3.0	3	100	100
Humanities	24	24.5	13	54	53
I & Mgt. Eng.	13	18.5	5	39	27
Mathematics	24	27.0	16	67	59
Mech. Eng.	31	33.5	28	90	84
Org. & Soc. Sc	17	22.5	9	53	40
Physics	26	30.0	22	85	74
TOTAL	271	330.0	160	59	49

Note: Data for this table, recorded in September, varies ±1 from November data used elsewhere in this report.

Excludes 9 administrators holding academic rank and tenure.

TABLE A10.1 LIBRARY STAFFS - RANKED BY SIZE AS OF JUNE 30, 1977

	Professional Staff Staff	Non-Professional Staff	Part-time Staff (FTE)	Total
NJIT	7	10	1	18
Montclair State College	18	32	4.5	54.5
William Paterson	21	22	4	47
Trenton	19	18	4	41
Stockton*	12	26	2	40
Kean	13	17	9.8	39.8
Ramapo*	14	19	0	33
Glassboro	16	21	1.5	38.5
Jersey City	14	15	0.7	29.7
CMDNJ*	15	14	0	29
Essex*	12	20	0	32
Rutgers Newark	9	26	0	35

*Includes Media Center

TABLE A10.2 FUNCTIONS AND CAPABILITIES OF INSTRUCTIONAL MEDIA CENTER

Black line 8-1/2 x 11 overhead transparencies

Spirit Masters
- 3M thermofax machines (2 each)
- 7 - 15,000 transparencies, 5 - 7,000 spirit masters

Graphic Services
- pen & ink line drawings
- dry transfer letters
- dry mounting & laminating for display
- 35 mm Diazo slides (1 color, tint, & black)

Photographic Services
- 35mm photographic services
- photographic copying of slides from books and magazines
- slide duplication
- studio & on location photography
- all laboratory services are provided through outside vendors.

Audio Production
- high quality 4-track reel-to-reel tape
- audio mixer allowing transfer of 4 track tapes to half or full track tape
- limited playback facilities exist for cassette and reel-to-reel (mono) tapes to allow sync with slide projector, 1 record/playback unit, 1 playback unit.

—Continued

TABLE A10.2 - Continued

Video Production
- facilities for black & white line production 1/2 or 3/4 in.
- facilities for color video recording of 16mm & Super 8 film, 35mm slides, or art work.
- color 3/4 inch video playback facilities in RM.112H IMC only (no video editing capability).

black & white 1/2 inch video playback facilities are available at TLH II, 329L, Institute Center, and IMC.

TABLE A10.3 N.J. STATE COLLEGE MEDIA BUDGETS, FY 76/77

	Supplies Total / Per FTE	Equipment Total / Per FTE
NJIT	$*13,160 - 3.13***	$10,348 - 2.46***
Glassboro	30,000 - 4.17	48,000 - 6.67
Jersey City	54,000 - 9.05	2,000 - .34
Kean	30,000 - 3.73	25,000 - 3.11
Montclair	31,000 - 3.11	35,157 - 3.53
Paterson	*15,000 - 1.25	32,500 - 2.70
Ramapo	21,000 - 6.56	575 - .18
Stockton	45,695 -12.02	17,311 - 4.56
Trenton	**19,500 - 2.53	27,737 - 3.60
MEAN	30,774 - 5.30	23,535 - 3.09

*Does not include film rentals.
**Does not include film rentals or production costs
***Based upon 4000 FTE students

Source: Assoc. of State College Media Directors

TABLE A10.4 N.J. STATE COLLEGE MEDIA PERSONNEL, FY 76/77

	Professional	Classified Technical/Clerical		P/T	Student	Hours Per Week
NJIT	1	1		0	4	44
Glassboro	2	1	1	1	12	52
Jersey City	5	3	4	4	30	65
Kean	5	3	2	6	30	69
Montclair	5	0	4	1	56	67
Paterson	1	0	3	1	25	72
Ramapo	4	5	1	0	10	62.5
Stockton	5	4	1	1	21	58
Trenton	4	5	3	4	35	60
MEAN	3.9	2.6	2.4	2.25	27.4	63
		5.0				

Figure A10.1

PLANNING SCHEDULE FOR EXPANSION OF NJIT CENTRAL COMPUTING FACILITY

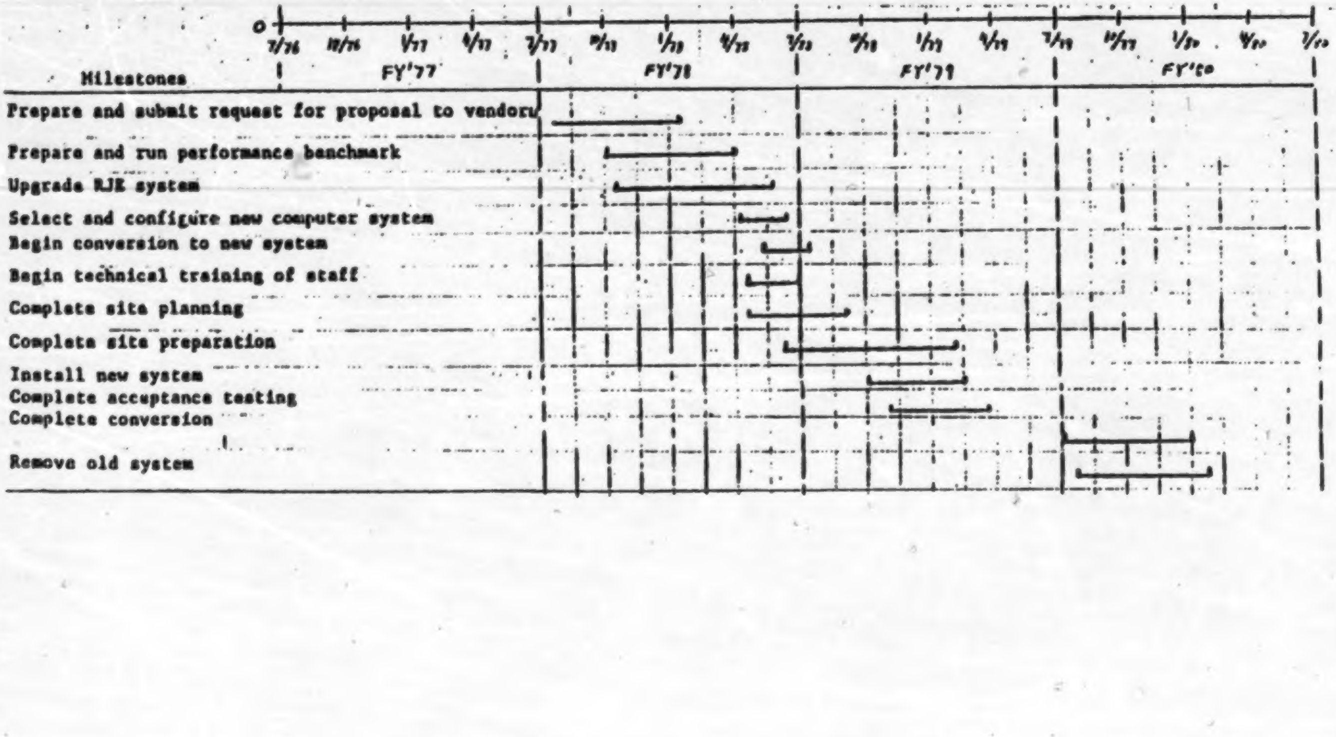
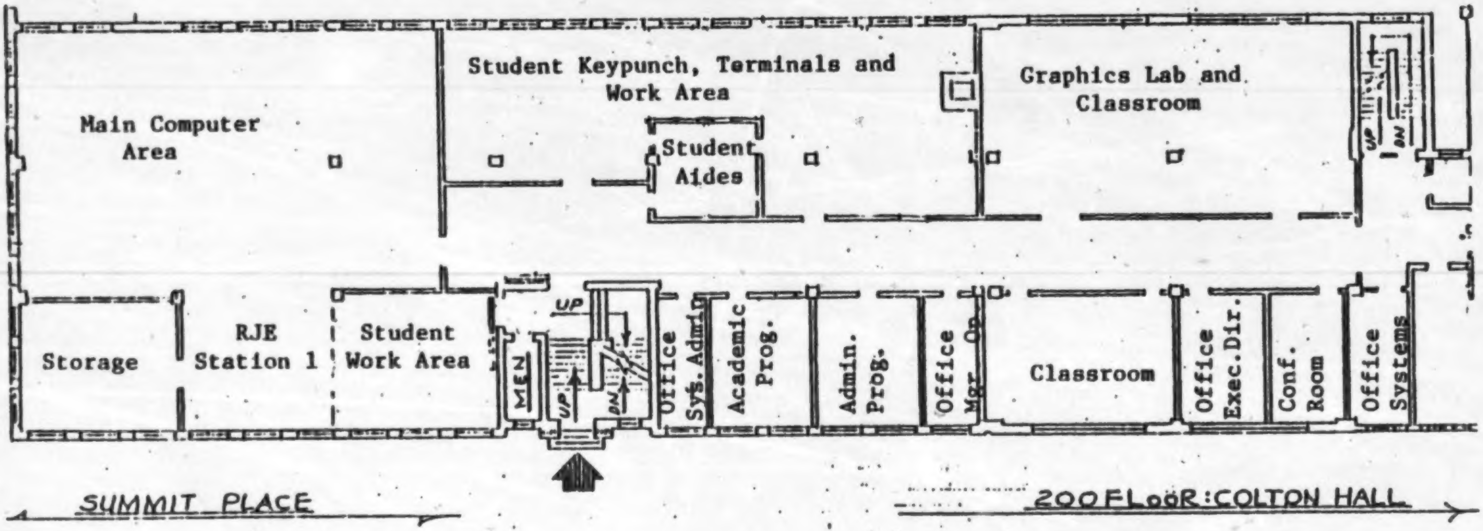


Figure A10.2


Student Keypunch, Terminals and Work Area
Graphics Lab and Classroom
Main Computer Area
Student Aides
UP
DN
Storage
RJE Station 1
Student Work Area
MEN
UP
UP
DN
Office Sys. Admin.
Academic Prog.
Admin. Prog.
Office Mgr. Op.
Classroom
Office Exec. Dir.
Conf. Room
Office Systems
SUMMIT PLACE
200 FLOOR: COLTON HALL

DEPARTMENT OF COMPUTER SERVICES
FUTURE LOCATION IN COLTON HALL

TABLE A10.5

NEW JERSEY DEPARTMENT OF HIGHER EDUCATION
COMPUTER ACTIVITIES REPORT

Summary of Data Processing Expenditures

Fiscal Year 1976-77

Sector	Total E&G Budgets	Net Data Processing Budgets	Percent of Total E&G Budgets	FTE's	E&G Expenditures per FTE	Data Processing Expenditures per FTE
Community Colleges	$123,895,842	$ 4,023,432	3.25	58,266	$ 2,126.38	$ 71.55
State Colleges	134,140,389	2,715,964	2.02	56,974	2,354.41	47.67
State Universities & Professional Schools:						
CMDNJ	46,832,000	1,280,000	2.73	1,248	37,525.64	1,025.64
NJIT	16,893,347	604,800	3.58	4,052	4,169.14	149.26
Rutgers	177,704,428	3,697,538	2.08	35,320	5,031.27	104.69
Subtotal	241,429,775	5,582,338	2.31	40,620	5,943.62	137.43
Public Sector Total	409,466,006	12,321,734	2.47	155,860	3,204.58	79.06
Independent Colleges & Universities	236,469,647	5,959,035[2]	2.52[1]	46,968	5,034.70	128.34[2]
Total	$735,935,653	$18,280,769	2.48	202,828	$ 3,628.37	$ 90.13

[1] Percentage figure taken from FY 1974-75.

[2] Calculated using FY 1974-75 percentage of Net Data Processing Budget to Total E&G Budget.

Source: "Fiscal Year 1977 Computer Activities Report"
M.M. Greco, N.J. D.H.E., April 27, 1978.

TABLE A10.6 NJIT FINANCIAL AID PROJECTIONS: 1977-1980

	1977-1978		1978-1979		1979-1980	
STATE SOURCES	AWARDS	AMOUNT	AWARDS	AMOUNT	AWARDS	AMOUNT
PTA	650	$130,000	---	---	---	----
TAG	---	---	300	$ 228,000	350	$ 266,000
GSS	---	---	42	31,920	42	31,920
NJSS	252	191,520	100	76,000	50	38,000
EOF	135	101,250	190	150,400	190	150,400
Guaranteed State Loan	250	375,000	300	450,000	350	600,000
Student Employment	See*	130,000	250	120,000	250	120,000
Subtotal	1,237	$927,770	1,182	$1,056,320	1,232	$1,206,320
FEDERAL SOURCES						
BEOG	660	668,900	800	950,400	850	1,009,800
SEOG	118	57,000	140	70,000	150	75,000
NDSL	57	37,750	60	40,000	50	40,000
Work Study	*250	97,000	250	100,000	250	110,000
Subtotal	1,085	$860,650	1,250	$1,160,400	1,300	$1,234.800
NJIT SOURCES						
DOT	11	2,500	11	2,500	11	2,500
Chemical Eng. Dept.	100	46,650	100	50,000	110	55,000
Alumni Assocation	19	9,320	30	15,000	40	20,000
F-1 Tuition Remission	18	6,840	20	15,200	20	15,200
Financial Aid Office	133	67,550	145	72,500	150	75,000
NJIT Loans	4	3,410	10	8,000	20	16,000
Subtotal	285	$136,270	316	$ 163,200	351	$ 183,700
OTHER SOURCES						
Professional Architecture Assoc.	8	3,910	8	3,900	10	4,500
Outside Scholarships	75	56,000	75	56,000	80	60,000
National Fund Minority Engrg.	18	7,800	20	15,200	20	15,200
Subtotal	101	67,700	103	$ 75,100	110	$ 79,700
TOTAL	2,708	$1,992,390	2,851	$2,455,020	2,993	$2,704,520

TABLE A10.7

FULL-TIME EMPLOYEES
JANUARY 1975 -- JANUARY 1978*

	1975 Total Number	1976 Total Number	1977 Total Number	1978 Total Number
Instruction				
Faculty	241	247	238	268
Support	51	50	55	62
	292	297	293	330
Research	9	6	5	5
Public Service	3	2	2	3
Academic Support				
Deans Office (s)	8	6	5	7
Theatre	3	3	3	3
Computer Service	17	13	15	17
Library	15	14	15	17
Instructional Media	3	2	2	2
	46	38	40	46
Student Services	57	52	46	50
General Institute				
Administration	30	22	24	27
Staff	33	31	46	52
	63	53	70	79
Physical Plant	51	52	48	66
Auxiliary Enterprises	33	36	31	31
Institute Total	554	536	535	610

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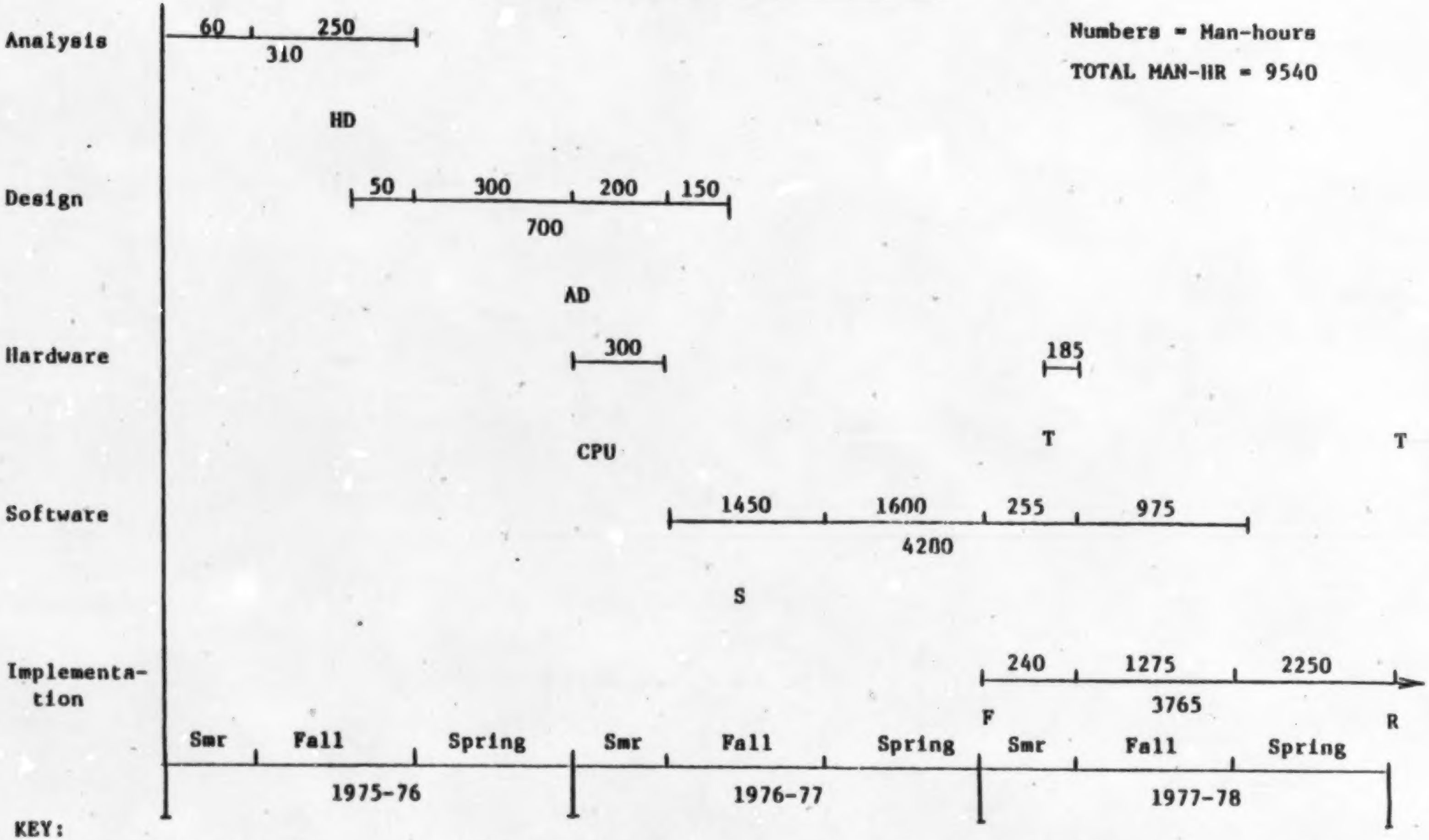
*Payroll headcount in January of each year.

Figure A10.3

CHART FOR MANAGEMENT INFORMATION SYSTEM



KEY:

HD = Hardware decision

AD = Need for system analysist and database administrator

S = Purchase query language

F = Freeze on all programming for old system

CPU = Acquire new computer (?)

T = Acquire 2 terminals/year for 4 years

R = Student registration data base in operation for Fall 1978.

FAR 7/75

TABLE A13.1

INSTITUTE COMMITTEES

1977 - 1978

1. EXECUTIVE COMMITTEE: Chaired by the President; meets monthly to consider matters of general academic administration.

2. COMMITTEE ON ACADEMIC AFFAIRS: Meets at least monthly and is charged with overseeing the undergraduate and graduate curriculum.

3. COMMITTEE ON ADMISSIONS: Recommends standards, policies and procedures primarily for undergraduate admissions.

    3a Ad hoc COMMITTEE ON RECRUITMENT OF HISPANIC STUDENTS: Special Advisory Body to the President.

    3b COMMITTEE ON FINANCIAL AID: Advisory body to Student Financial Aid Program.

    3c COMMITTEE ON HIGH SCHOOL & COLLEGE PROGRAM: Initiates plans and reviews Institute programs for high school students.

4. COMMITTEE ON ACADEMIC STANDING: Administers policies relating to the academic standing of students, including probation and dismissal.

5. STUDENT ACTIVITIES BUDGET REVIEW BOARD: Reviews funds expended for student related activities.

6. COMMITTEE ON BIO-MEDICAL ENGINEERING: Reviews bio-medical courses and coordinates related activities; liaison with CMDNJ.

7. COMMITTEE ON ACADEMIC COMPUTER USAGE: Reviews and evaluates academic computer usage.

8. COMMITTEE ON COOPERATIVE EDUCATION: Coordinating committee for cooperative education programs.

9. COMMITTEE ON EDUCATIONAL OPPORTUNITY PROGRAM: Consulting and advisory body for Educational Opportunity Program.

10. COMMITTEE ON GRADUATE STUDIES AND RESEARCH: Reviews and makes recommendations for graduate courses, current and proposed research activities.

11. COMMITTEE ON LEARNING RESOURCES: Encourages and supports use of Instructional Media.

12. LIBRARY COMMITTEE: Advises the Librarian on policies, procedures and practices.

13. LONG RANGE PLANNING COMMITTEE: Is concerned with the development of institutional goals and mission.

14. COMMITTEE ON MAN AND TECHNOLOGY PROGRAM: Coordinating committee for Man and Technology Program.

15. COMMITTEE ON MS APPLIED SCIENCE PROGRAM: Coordinating committee for this interdisciplinary program.

TABLE A13.1 - Continued

16. COMMITTEE ON PARKING: Evaluates, reviews and recommends action on matters concerned with campus parking.

17. INSTITUTE COMMITTEE ON PROMOTION & TENURE: Reviews and evaluates the promotion and tenure recommendations of the department committees, taking into account the overall needs and objectives of the Institute.

18. COMMITTEE ON PUBLIC RELATIONS: Concerned with the development of a comprehensive Institute approach to both internal and external constituencies.

    18a COMMITTEE ON INSTITUTE AWARDS: Receives and makes recommendations for Institute awards and honorary degrees.

    18b COMMITTEE ON WUENSCH DESIGN AWARDS: Receives and approves applications for an award given to undergraduate engineering students for a paper or project related to design.

    18c FOUNDERS DAY COMMITTEE: Responsible for NJIT's major social function, commemorating founding of original school in 1881.

    18d COMMENCEMENT COMMITTEE: Responsible for planning for Commencement.

    18e OPEN HOUSE - GET ACQUAINTED DAY COMMITTEE: Responsible for planning for Open House - Get Acquainted Day.

19. COMMITTEE ON SABBATICALS: Reviews and evaluates requests for sabbaticals.

20. Ad hoc COMMITTEE ON SAFETY & SECURITY: Evaluates, reviews and recommends action on matters concerned with campus safety and security.

21. SPACE ALLOCATION ADVISORY COMMITTEE: Advises the President on the use of space for academic needs.

22. COMMITTEE ON STUDENT APPEALS: Appeal body for students who are on academic probation or seek readmission after having been dismissed.

23. COMMITTEE ON STUDENT-FACULTY RELATIONS: Seeks to maintain and improve communications and interaction between students and teaching staff.

24. COMMITTEE ON STUDENT PROFESSIONAL CONDUCT: Meets to review infractions of the Institute's professional conduct regulations.

25. COMMITTEE ON TECHNOLOGY: Coordinating committee for Bachelor of Science in Engineering Technology Program.

26. COMMITTEE ON TECHNOLOGY ASSESSMENT: Advisory to the Technology Assessment Center.

27. COMMITTEE ON UNDERGRADUATE COURSES: Considers new courses proposed by departments; looks at costs, prerequisites, content, etc; advises Committee on Academic Affairs.

28. COMMITTEE ON UNDERGRADUATE ENGINEERING SCIENCE PROGRAM: Coordinating committee for Engineering Science Program.